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Accounting During Inflation

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"Lifo" for Both Inventory and Plant Assets

by HERBERT T. McANLY

WHILE INFLATION CREEPS into corporate accounts in almost as many forms as taxes do, there are two principal areas in which it does serious damage. One of these is inventories, depreciation of fixed assets the other. Failing to make allowance for the effects of inflation in these areas can cause significant errors in the calculation of income.

Investments in inventories and plant facilities are assets representing, in effect, "prepaid expenses," which are necessary continuing investments to the going concern. Being replaced currently or periodically, they become a part of costs, which are converted into receivables along with realized profit margin. The realized profit, reflected in the income account or earned surplus as this "operating cost" is transferred to a receivable status, must represent the difference between current selling price dollars and current cost price dollars of actual or accrued replacements.

Through the last-in, first-out concept of inventory pricing broadly applied, any increased cost carrying the same aggregate quantity of inventory is automatically charged against current income. Generally, the inventory investment turns over one or more times each year so that, keeping the required investment at a frozen price level results in charging any increased cost of carrying the inventory to cost of sales. However, plant assets turn in an annual period only a fraction of a turn. A depreciation rate of 5 percent means a twenty-year period before the original cost has been recovered or "turned over" as a charge against income. Thus the increased cost of eventual replacement or, stated in another way, the loss in purchasing power of the dollars recovered in depreciation, must be accrued currently as a deficiency in cost depreciation provisions.

"Lifo" for Inventories—Its Application and Acceptance

Over the past twenty-two years, the use of "lifo" for inventory pricing has become prevalent throughout industry. It is also significant to note that the Depart-

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HERBERT T. McANLY, Cleveland Chapter (Indianapolis, 1927), C.P.A., is Partner, Ernst & Ernst, Cleveland, Ohio, and National Director of its Management Services Division. He holds a Doctor of Laws degree from Wittenberg College. Mr. McAnly is a previous contributor to the *Bulletin*. He is a recipient of four Certificate of Merits, the latest of them awarded in 1960-61 for this article. Mr. McAnly has been identified with the broad extension of "lifo" for more than twenty years, having developed the dollar-value-lifo application in 1941 which is now widely used.

ment of Commerce, in its determination of national business income, develops inventory valuation adjustments which in effect put all industry on a "lifo" basis. Its 1951 income supplement includes the following statement (page 39): "The LIFO method of inventory accounting yields results most akin to national income practice." In other words, to determine national business income on a sound basis, our Department of Commerce excludes from income any amounts which result from price fluctuations in continuing inventory investments.

It must be recognized, however, that the number of companies actually using "lifo" cannot be taken as a true indication of its acceptability by business; it indicates only that the inflationary trend has been accepted by many as a built-in part of our current and future economy and that many companies have ceased to await the coming of a more favorable cost level. The number of companies using "lifo" includes many who were able to get an early start, since some portions of their inventories appeared to permit the application of "lifo" on an item basis which was the only basis recognized in the early regulations. The use of the item basis—matching of physical units—narrowed the application so that many companies which recognized the "lifo" principle, applied it only to portions of their inventories. Other companies widened their item application by grouping products and using average tonnage or average item prices for the group.

However, the use of an average price to cover a group of products, whose individual prices vary widely, assumes that the relative mixture of the products in the group will remain constant, a condition which seldom exists. Even if no changes in products take place, it would be something like a miracle if the relative quantities of each product in a group were always the same at each inventory date. Changes in products and in the demands for each bring about permanent changes in their mixture so that the use of group average prices can produce erroneous and widely distorted profits.

The last-in-, first-out concept should result in matching latest incurred costs against sales of the whole business entity, thus more realistically reflecting profits which are available for distribution in dividends, taxes, wage increases, possible price reductions, etc. The end result of the "lifo" method is that the entire inventory at the end of a year is valued at cost levels at the beginning of the year, except for any increases in the aggregate quantity of inventory; hence, profits are not distorted by inventory price appreciation (or depreciation) when "lifo" is used. In periods of rising prices, it eliminates from taxable income the additional dollars needed to carry the same quantity of inventory. Neither taxes nor dividends nor increases in wages can be paid from such inventory appreciation.

This realistic determination of available income cannot be accomplished by only a limited application of "lifo" or by attempting to widen the application through

a hybrid method of using average prices of groups of products. To accomplish the objective of realized profit determination under "lifo," the pricing principle must be applied to the entire inventory investment in a manner which recognizes all changes in its make-up but treats the investment as a unit. Thus, all items making up the total must be reduced to a common denominator, dollars of investment at a fixed price level.

Early in 1941, dollar value "lifo" was applied to a number of retailers, wholesalers and manufacturers with complex and rapidly changing inventories. Since 1941, an increasing number of companies have turned to "lifo"—some converting from either the individual-item or-average-group pricing bases, others adopting it originally. A recent survey conducted by the A. I. C. P. A. for the U. S. Treasury Department disclosed that approximately 400 companies with total "lifo" inventory value of $4 billion use the "lifo" dollar value basis of pricing.

"Lifo" for Inventories—Evolution and Development of the Principle

Possibly a little historical summary of the evolution of the dollar value "lifo" basis would be in order.

As far back as the latter part of the nineteenth century, some companies, particularly those engaged in processing of basic raw materials, designated a certain quantity as "base stock" and valued it at a constant, more or less arbitrary price. They did so to minimize the distortion of profits caused by fluctuations in the price levels of the required inventory investment.

At the inception of the income tax laws in 1913, only actual inventory cost was accepted as a basis for income determination and later, in the early twenties, the lower of cost or market was recognized as a method in the pricing of inventories. The use of the base stock method was prohibited by regulation. The U. S. Supreme Court in Lucas vs. Kansas City Structural Steel Company (281 US 264-1930) held against any form of base stock method which froze an arbitrary quantity at arbitrary price.

But many businessmen and economists remained dissatisfied with the use of the latest current costs for pricing inventories. Price fluctuations of the required fixed investment in inventory distorted profit and, in a rising market, taxes were imposed on unrealized profits, resulting from this increased inventory value.

In 1938, Congress recognized the inequity of this result, insofar as it applied to tanning and to the nonferrous metal industries and enacted as an elective method, the last-in-first-out method of valuing inventories. This method permitted the portion of the ending inventory which equals the beginning quantity to be valued at the beginning inventory price level. In 1939, recognizing that, if

the principle was sound for a limited number of companies, it was sound for all, Congress extended the right to adopt "lifo" to all taxpayers. Since "lifo" originated in industries where the inventory consisted of one or a few basic items for which the levels of inventory could be readily measured in quantities of common product units, the regulations were written to deal only with quantities of items implying specific identification of goods of uniform physical likeness or composition.

In 1940, World War II had caused inflation and many more companies became interested in "lifo" to eliminate profits to the extent that they were due solely to price rise in inventories. Retailers, wholesalers, and those engaged in manufacturing diversified products, using many raw materials or parts, were faced with the problem of how to apply "lifo," since identical cost matching by quantities was impractical or even impossible, due to style or design changes, temporary fluctuations in quantities of individual items at any inventory date, substitutions of materials, changes in methods of production, etc.

However, a very simple solution was developed, that is, to deal with the inventory of any business unit as a composite in terms of dollars and to compute the index of price change contained in the ending inventory as compared with the beginning-of-year costs. The index of price change applied to the end-of-year costs sets forth the inventory equivalent at beginning-of-year price levels. If there is an increase in the aggregate quantity of inventory measured in beginning-of-year cost dollars, the increase would be valued at current-year cost by adding to the increment the price increase factor. This dollar value method was adopted by a number of businesses as a sound method of applying the "lifo" principle to a complex inventory. Included in the group of companies adopting this procedure in 1941 were a number of large department stores which had a great diversity of goods.

The test case for dollar value "lifo" application was Hutzler Bros., a Baltimore department store. It came to trial before the Tax Court on November 13, 1945. On January 14, 1947, the Court, by a 14 to 2 vote, found in favor of Hutzler Bros. (8 TC 14). The Court held that specific identification of goods was not required, that the results obtained by departmental pooling and application of indexes of price changes (determined on a national and not on an individual store basis) resulted in compliance with Section 22 (d) of the Internal Revenue Code.

On March 4, 1948, Treasury Decision 5605 was issued, permitting retailers to use the method, and retroactively so. Stores that had elected "lifo" and had been denied its use by the Bureau of Internal Revenue and had paid deficiencies, obtained refunds covering the years back through 1941 which had been kept open taxwise by waiver of the statute of limitations.

The Treasury on November 2, 1949 issued Treasury Decision 5756 amending its regulations retroactively to permit the use of the "dollar-value" method. Since the issuance of TD 5756, there have been many inconsistent decisions in the field relative to acceptable mechanics of the dollar-value method. Many settlements have merely been compromises and others are now on appeal to the Tax Court.

In 1954, a proposed revenue ruling, dealing with "lifo" dollar value, was submitted by the Commissioner to the then Commissioner's Advisory Committee made up of three representatives from each of the following groups: American Institute of Accountants, American Bar Association, Tax Executives Institute. These, in turn, referred the proposal to the appropriate committees of their own organizations. The ruling was generally disapproved by the Commissioner's Advisory Committee because it called for the breaking down of the inventory into many pools or classifications, instead of dealing with the over-all inventory investment of a unit of a business. However, the sections of it dealing with the development of index numbers, including the so-called link-chain index, were deemed satisfactory and practical. However, because of the general disapproval mentioned, the ruling was withdrawn in 1954 and the Commissioner of Internal Revenue agreed that the whole subject should be restudied and resubmitted to groups of taxpayers.

Subsequent to the withdrawal of the proposed revenue ruling, an informal group of taxpayers was formed at the suggestion of the then Internal Revenue Service's Assistant Commissioner for Planning. This group submitted suggested regulations under date of August 10, 1955 which, in substance, called for a single pool for a business unit and embraced the development of index numbers as outlined in the 1954 Commissioner's proposed ruling. A meeting was arranged for January 10, 1956 at which detailed examples based on actual cases were presented by this group.

During the past three years, representatives of the major national accounting firms, including the informal group mentioned above, have worked with Treasury Department in an endeavor to have adequate regulations issued. Early this year, the A. I. C. P. A. conducted a survey for the Department to determine the extent of the use of "lifo" dollar value, the numbers of pools in use by the individual companies, etc. Of 400 odd companies using the dollar value method, approximately 140 use a single pool. Substantially more than half use three or less pools and many of those reporting more than three pools include retail and wholesalers who actually use a single pool for each business unit (department) and other companies which, through compromise settlements, have been forced to the use of multiple pools.

In addition to submitting the results of the questionnaire covering "lifo" dol-

lar value pooling methods in use, the A. I. C. P. A. was asked to select three individual members who had not been identified to any extent with "lifo" in the past twenty years, to express their views on the pooling of "lifo" inventories by the use of dollar value method. Their release to Treasury Department advocated in substance the use of a single pool for each economic activity within a business enterprise (a business unit) and coincided generally with the recommendations made by the informal taxpayer group to Treasury in 1954.

Regulations relating to the dollar-value "lifo" method were finally issued on January 20, 1961. The Treasury Department, in these regulations, adopted the business unit criterion for pooling as one of several permissible methods and generally outlined procedures to be followed in development of indices, etc.

The original decision of the Klein Chocolate Company case in which the court upheld the Commissioner in calling for multiple pools in place of a single pool also was reconsidered by the court after it was pointed out that the original opinion admittedly overlooked the fact that the company had consistently used an approved single pool basis for the four previous years. On April 21, 1961, the court issued its second opinion in the Klein Chocolate case, reversing its original decision and holding for the petitioner on the ground of consistency.

"Lifo" for Inventories—Technicalities of the Dollar Value Method

All items in an inventory can be expressed in a common unit, which is "dollars" of investment at a specific price level. By using a basic dollar value as the common denominator, we can, therefore, easily apply the last-in, first-out principle, regardless of the complexity of the inventory. The objective is to express the ending inventory at the beginning-of-year price levels of materials, labor and overhead. In some cases, it is practicable to extend the quantities on hand at the end of the year—of each raw material, production in process and finished product —at the beginning of-the-year price levels.

If the total of the ending quantities, priced at the beginning cost price-levels, does not exceed the cost price of the beginning inventory, this total would represent the true "lifo" cost assignable to the year-end inventory. If the ending inventory priced at the beginning cost price-levels exceeds the beginning inventory, the excess represents an aggregate quantity increase. For example, if the ending inventory, priced at the beginning-of-the-year inventory totals cost levels, totals $2,000,000, and the beginning-of-the-year inventory totals $1,750,000, only the difference of $250,000 would be an aggregate quantity increase, because both inventories have been priced at the same levels. Only the excess, representing the

aggregate quantity increase in the ending inventory, need be brought up to the current cost levels (either the year's earliest, average or latest) under a "lifo" calculation.

Frequently, it is not practicable to compute the total inventory at beginning cost price-levels. New items have entered the line or changes have occurred in item specifications or in the time required in manufacture, so that beginning-of-the-year item costs applied to current manufacturing specifications of quantities of materials and processing hours, are not readily available. In such circumstances, an index of price increases can be developed by using a substantial representative portion of the ending inventory in making a weighted comparison of beginning and ending price-levels. This index can be used to reduce the total current cost price of the ending inventory to the beginning cost price-level for the purpose of determining the portion of the inventory to remain at the beginning cost price-level, and the extent of aggregate quantity increase.

It is important, in the development of this index of price change, that reductions in unit cost of manufactured items due to other-than-price reductions not be permitted to offset price increases. Thus, the quantity of an item of finished product in the ending inventory, which is used in the development of an index of price change, should be extended at the current and at the beginning-of-the-year cost price-levels of materials, labor and overhead for the quantity of materials and processing hours called for in its current processing specifications.

If "earliest" acquisition costs are to be applied to the dollar quantity increase, an index of cost increase should be developed by comparision of beginning-of-the-year cost prices with cost prices applicable to the earliest period in which the equivalent of the dollar quantity increase was produced or acquired. Thus, an index of end-of-the-year cost price-level over the beginning cost price-level would be used to reduce the total current cost-level to the beginning basis, and the index developed to cover the cost increase applicable to the earliest acquisitions would be used to price the dollar portion representing the quantity increase in inventory.

The new regulations generally favor the development of an index in relation to the base date (year of adoption) but leave the door open for the use of this so-called "link chain" idea if its accuracy and practicability can be demonstrated to the satisfaction of the Commissioner.

If indexes are developed each year to cover the cost price increases of that year, they can readily be adjusted to give effect to the increase in cost level over the base cost established the first year of the adoption of "lifo." As the years go by, comparisons of beginning and current cost-levels to determine the index of price increase for the current year are more readily calculable than a current-

year cost comparison with the base cost level, since many items disappear entirely or are greatly modified over the years.

"Lifo" for Plant Investment—Adjustments to Cover Loss Caused by Inflation

So much for keeping inflation out of inventories. Let us now turn to second major area in which inflation causes distortion of income: the gradual turnover of plant assets through depreciation. As in the case of inventories, there is a reasonable and workable solution to the problem in this area. For more than ten years,[1] a few accountants have been advocating the need for recognition of the change in purchasing power of funds recovered in depreciation, through the introduction of a reserve to prevent capital impairment due to the accumulated depreciation deficiency. If recognized accountingwise, tax recognition in some form should eventually follow. However, industry has been reluctant to proceed without some assurance of tax recognition. Congress and the Treasury Department have advanced a primary argument that it would be difficult to justify the accrued deficiency as a current tax deduction, since the actual monies have not as yet been expended and conditions could change so that their need would fail to materialize.

Recently an answer to this objection called "reinvestment depreciation" has been developed. Briefly, this is a method of calculating the effect of inflation at the end of the useful life of assets and qualifying the resulting dollar figure as a tax deduction. The deduction would apply to the extent that new assets were purchased within a reasonable period of time. The calculation would employ an appropriate government index of capital purchasing power computed each year.

As a tax measure alone, it does not provide the funds to cover the full accumulated accrual of the depreciation deficiency caused by inflation. It would provide (at present tax rates) for 52 percent of the funds needed to cover the decline in the value of the dollar between the time of the original investment and the time the replacement expenditures are made. Thus, it is only a timing device for the tax deduction; it must be coupled with sound accounting methods for recognizing the year-to-year accrual of depreciation deficiencies so as to reserve funds sufficient to meet the after-tax portion of the deficiencies.

The tax proposal has been well thought out and is strongly supported. Whether it will become law remains to be seen. In considering its possibilities, we would

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[1] "Preserving the Integrity of Equity Capital," H. T. McAnly and William T. Sunley, *Controller*, October, 1947.

do well to remember that, normally and naturally, legislative tax provisions follow rather than precede business practice. The inadequacy in present depreciation should be recognized and corrected in business practice as well as in the laws that govern the taxation of businesses.

Reinvestment depreciation as a tax measure would recover the taxes applicable to the accrued depreciation deficiency at the time the money is needed to effect plant asset replacement. It seems that, if business accounting practice called for the accrual of the depreciation deficiency—even though on a basis that can only be approximate—Congress would be more inclined to provide, through allowance of reinvestment depreciation, for its ultimate recognition when the actual amounts become determinable at the time of asset retirement and the re-expenditure of funds. Failure to provide for the net after-tax amount of the deficiency, as an annual accrual and a reduction of net profits on the company books, could be construed as asking for only 52 percent of the amount needed, while ignoring the remainder.

"Lifo" for Fixed Assets—Accounting Procedure

Let us briefly review the accounting procedure which would accrue the net after-tax depreciation deficiency annually. The essential point is that we recognize currently the change in the purchasing power of all funds being recovered in depreciation. This adjustment in the accrued depreciation provisions can be represented by a "reserve to prevent capital impairment." The adjustment, to be realistic, must allow for the change in the value of the dollar from the date the assets were originally purchased to the end of the fiscal year being reported. To conform to change in the value of the dollar, adjustment of the accrued depreciation should cover not only the current year but also all prior years. Under reinvestment depreciation, the cumulative adjustment would become a tax deduction in total when the asset is retired if funds comparable in amount are expended within a reasonable period.

A prerequisite of such a method, a reliable index of the current value of the dollar, can easily be based on facts gathered and issued by the Government. Already available are the Department of Labor's cost of living index, the Bureau of Labor Statistic's wholesale commodity index and the several construction cost indices. The index selected would not be of fundamental importance, so long as all companies and taxpayers used the same one. We are not talking about replacement of specific assets, but the adjustment of depreciation dollars to their approximate current purchasing power.

The depreciation provisions for the year could be computed on any of the gen-

erally accepted bases. The accumulated reserve for depreciation should be broken down into the amounts which apply by years of acquisition of assets. The accrued depreciation applicable to the assets acquired each year should be adjusted for the difference between the index of that year and the current index. The total of the adjustments would represent the total depreciation deficiency. The difference between the amounts so determined at the beginning and end of the year would represent the accumulated depreciation deficiency applicable to the current year. Thus, the additional depreciaton deficiency, computed as applicable to the current year, covers both the amounts applicable to the current year's provisions and the adjustment of the prior years' provisions.

Assets should be depreciated until the reserves for depreciation on cost equals the original cost (or until retired), regardless of the additional amounts which have been provided for the depreciation deficiency and credited to the reserve to prevent impairment of capital.

The tax eventually recoverable on these provisions for the accrued depreciation deficiency could be reflected as a long-term receivable but, probably, more properly deducted from the reserve to prevent capital impairment through accruing the latter on a net after-tax basis, since its realization results from eventual recognition taxwise of the reserve provisions. The tax recovery through reinvestment depreciation covers an accrual at the end of the asset's productive life. It is, thus, retroactive and has no bearing on the value of the new assets acquired. All additions should always enter the property records at the dollar level of the date of their acquisition. Subsequent depreciation would be figured on the cost, with adjustments for additional depreciation based upon the relationship of the current dollar index to the value of the dollar at the date of acquisition.

Applied as a tax measure, reinvestment depreciation would effect tax recovery as assets are retired and monies expended equalling their costs adjusted to a current dollar basis. However, this tax recovery should not affect the current profit picture, since the accumulated accrual of the deduction on a net after-tax basis has been charged against profit and thus recoverable taxes have been provided for. The tax recovery through reinvestment depreciation becomes in effect an additional credit to the reserve to prevent capital impairment. Thus, the reserve to prevent capital impairment will eventually contain the total amount needed to cover the decline in purchasing power of the funds recovered in depreciation provisions, both the amount recovered in taxes and the amount properly provided for out of net profit.

The reinvestment depreciation concept emphasizes tax relief on a going concern basis by providing for tax deductions only on depreciation recoveries which are reinvested. Any future tax liability applicable to the amounts which have been

allowed as tax deductions covering deficiencies in depreciation provisions should not be payable as long as the going concern needs exist. If retrenchment or liquidation takes place, possibly a capital gains basis of taxing would be more equitable.

Under the reinvestment depreciation provision such as is contemplated, retirement of assets should, as a practical matter, be broadly defined to include all fully depreciated assets—in other words, book retirement as well as physical retirement.

Fully depreciated assets which are still in use continue to be affected by inflation so they should continue to remain in the plant assets and depreciation reserve accounts and be included in the calculation of the total accrued depreciation deficiency. However, the difficulty of determining specific asset retirements for the calculation of the tax deduction in many situations would make this impractical. While treating fully depreciated assets as retired would prevent further accrual of any depreciation deficiency, if they remain in use, it could result in the use of more realistic depreciation rates, rather than the present tendency to get all the traffic will bear.

As sound accounting procedure, the use of a reserve to prevent capital impairment covering the depreciation deficiency arising from the decline in the purchasing power of the dollar—even though the provision is not currently deductible for tax purposes—has many parallels. These include: reserves to cover product guarantees or warranties, nonqualified pension programs, deferred maintenance, such as furnace relining, kiln rebuilding, etc., and bad debts (under the charge-off method for taxes). In all these, the tax deduction takes place when the event has occurred. Accountingwise, however, the accrual has been set up for each accounting period on as accurate a basis as can be estimated.

Reinvestment depreciation as a tax measure would serve as a stimulant to business and should not result in any substantial decrease in current national taxable income. It couples a tax recovery with an expenditure of several times the amount of the recovery, which should create more than enough taxable income to offset the decrease in income from the greater depreciation deductions.

Twin Concepts—And Equally Needed

I have attempted to show that we have at hand suitable methods for dealing with the two most serious errors that inflation creates in the income statement. The "lifo" method of valuing inventories has established itself as a useful and workable accounting procedure, and has been adopted by many of the largest corporations in the country. Yet in many companies it is imperfectly understood and it should be applied far more extensively than it has been. The "lifo" dollar

value method offers a simple solution to some of the problems involved in "lifo" and, as it comes to be more consistently recognized by the Federal Government, there should be fewer and fewer cases where the "lifo" concept is not applied in inventory evaluation.

Computing depreciation on the basis of value of fixed assets consumed, which is the twin brother of the "lifo" concept, still has a long way to travel before it reaches widespread acceptance, but it is every bit as sound:

1. The recognition of the change in the purchasing power of dollars recovered in depreciation provisions is a necessary and realistic approach in reflecting available profits of a going concern.

2. Reinvestment depreciation as a tax measure is a sound and practical means of timing the provisions for the accrued depreciation deficiency as a tax deduction.

3. Proper recognition of full depreciation provisions taxwise and accountingwise, not only will serve to conserve the tools of production, our nation's chief source of abundance and wealth, but can actually stimulate business through encouraging expenditures and, most important, can help to keep us "out in front" in technology and manufacturing skill.

The prospect is for continuing inflation. With an awareness of how such inflation distorts the accuracy of the income statement and with tools at hand for correcting these distortions, why do so many corporations continue on their old paths? The one reason that appears to have force behind it is that both "lifo" valuation of inventories and depreciation based on value of fixed assets consumed result in additional book charges against income, and a consequent reduction in apparent profit per share. With so many corporations competing for attention in the financial community—and with so many stockholders inclined to look for profit-per-share comparisons—management is loath to take on the additional charges against income supposedly created by these more accurate accounting methods, as long as accepted accounting principles permit a choice in the determination of profit.

The stumbling block, I believe, is with companies who say, "Well, to tell the truth, we need the profits." However, the "profit" that is properly transferable back to current operating costs was never available in the first place, and the sooner we can move the accounting for inventories and depreciation out of the realm of fantasy and into the world of present-day reality, the better.

Current Values—
An Imperative in Today's Financial Reporting

by HARRY N. KAMPH

CONVENTIONAL balance sheets and operating statements have become so distorted that they are of little or no guidance for decision-making purposes. Therefore, our companies have found it necessary to resort to year-end modifications for comparison purposes. These modifications, which give effect to current values, compensate for the distortions caused by:

1. Constantly growing inflation and rising market values as related to capital assets.
2. Rapid write-offs of depreciable assets as now permitted by Internal Revenue Service and by "generally accepted accounting principles."
3. The last-in-first-out ("lifo") technique of valuing inventories, recently liberalized by Internal Revenue Service to permit pooling of various inventory classifications.

Without such year-end modification of our financial and operating reports, we would find it difficult to measure what we have really achieved during the prior year or just what our business is worth as a going enterprise. Without taking into consideration current values, we find it impossible to reach valid conclusions or develop fully revealing information on such important matters as:

1. Return on total capital employed.
2. Return on capital equity or stockholders' investment.
3. Optimum mortgage loan financing terms.
4. Necessary coverage under fire and comprehensive insurance policies and proof of loss.
5. Evaluation of specific segments of an operation or an entire business for purposes of purchase, sale or merger.
6. Costs and profits measured in terms of current values rather than often misleading book or original values.

We are not alone in the attitude that, without current-value financial comparisons, management is likely to make costly errors in its judgments related to

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HARRY N. KAMPH, Los Angeles, 1922, is President of Business Systems Incorporated, Los Angeles, and of its two closely affiliated companies. He also serves in the capacity of a director for various other business concerns in the metropolitan Los Angeles area. Mr. Kamph is Past President of the Los Angeles Chapter. He is a previous contributor to the *Bulletin* and recipient of the Lybrand Silver Medal (1960-61) for an earlier article.

EXHIBIT 1

Balance Sheet Comparisons of Book to Current Values

Assets	Book values		Current values		Increase/Decrease due to current values End of present year		Increase/Decrease due to current values End of prior year		Net change in current values Balance sheet	Operating
Current										
Cash		150,000		150,000						
Accounts receivable	540,000		540,000							
Notes receivable	10,000		10,000							
less: Reserve	(40,000)	510,000	(40,000)	510,000						
Inventories		300,000		400,000		100,000		110,000		(10,000)
Other current assets		20,000		20,000						
Total current		980,000		1,080,000		100,000		110,000		(10,000)
Fixed										
Land		150,000		300,000		150,000		140,000	10,000	
Buildings	300,000		400,000		100,000		85,000		15,000	
less: Reserve	(75,000)	225,000	(110,000)	290,000	(35,000)	65,000	(30,000)	55,000		(5,000)
Machinery & equipment	700,000		1,200,000		500,000		470,000		30,000	
less: Reserve	(368,000)	332,000	(530,000)	670,000	(162,000)	338,000	(150,000)	320,000		(12,000)
Leasehold	20,000		52,000			32,000		35,000		(3,000)
less: Reserve	(4,000)	16,000	(4,000)	48,000						
Total fixed		723,000		1,308,000		585,000		550,000	55,000	(20,000)
Other		10,000		10,000						
Total assets		1,713,000		2,398,000		685,000		660,000	55,000	(30,000)
Liabilities										
Current										
Payables		250,000		250,000						
Accruals		100,000		100,000						
Taxes		125,000		110,000						
Total current		475,000		460,000						
Other		200,000		200,000						
Total liabilities		675,000		660,000						
Operating adjustments to bal.				30,000						
Capital										
Capital stock outstanding		225,000		225,000						
Earned surplus		688,000		688,000						
Surplus due to appreciation				685,000						
Net earnings (after taxes)		125,000		110,000						
Total capital		1,038,000		1,708,000						
Total liabilities & capital		1,713,000		2,398,000						

primary areas of responsibility such as the foregoing. Members of both the public accounting and industrial accounting professions have in recent years devoted considerable time and attention to this subject and the possible avenues of solution. As an example, Mr. Anson Herrick recently opened an article on "Inflation in Accounting"[1] with this paragraph:

> "The effects of inflation, as evidenced by the reducing purchasing power of our unit of financial reporting, the dollar, are *not* recognized in today's conventional accounting procedures. As a consequence the conventional income statement results in a stated net income which is at variance with, and usually exceeds, true income as recognized by the economists."

The article quoted was primarily concerned with (1) deficiencies in booked depreciation and depletion, and deficiencies in recorded costs at the time of capital asset sales and (2) gains in the liquidation of old debt through the medium of current, less-valuable dollars.

While this approach certainly can be approved by most readers, we find there are other problems of mounting inflation and rising market values, particularly as related to the balance sheet, which must also be given attention by the industrial accountant in order that his operating executives may draw logical and accurate conclusions.

There is a ready instance of this. The N.A.A. Research Report "Return on Capital as a Guide to Managerial Decisions," refers to the effects of inflation as seriously affecting the significance of investment figures. It is pointed out that the rate of return on capital would probably be halved if fixed assets were adjusted for changes in the purchasing power of the dollar.

Illustration of Modifications—Balance Sheet

It is our firm belief that the chief executives of any industrial enterprise have a right to, and should, receive annually, or even more frequently, from their accounting department the types of internal, comparative statements illustrated in Exhibits 1 and 2. These are modifications of reports through which our own companies' executives have attempted better to guide the destinies of our enterprises. The Balance Sheet Comparisons, Exhibit 1, provides sections for:

> *Book values* as conventionally recorded and as used for tax and public reporting purposes.
>
> *Current values* which reflect the effects of rising market values and other factors.

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[1] *The Journal of Accountancy*, September 1960, p. 51.

Profit and Loss Statement --
Present vs. Current Value Results

		Amount	%
Net sales		2,500,000	100.00
less: Cost of sales and period expenses		2,250,000	90.00
Operating profit		250,000	10.00
Income tax		125,000	5.00
Net earnings (after taxes)		125,000	5.00
Decrease in current value of inventories	10,000		
Increase in current value of building depreciation	5,000		
Increase in current value of machinery & equipment depreciation	12,000		
Decrease in current value of leasehold	3,000	30,000	1.20
Net earnings adjusted to current values (before tax effect)		95,000	3.80
plus: Reduced income tax on current value adjustments (50% X $30,000)		15,000	.60
Net earnings adjusted to current values (after taxes)		110,000	4.40

EXHIBIT 2

Increases or decreases due to current values at the close of the present year.

Increases or decreases due to current values at the close of the prior year.

Net changes in current values for the present year, segregated into:

a. Those which affect the balance sheet only.
b. Those which also have an effect on the operating statement for the current year.

The differences between certain of the book values and their corresponding current values can be explained briefly as follows:

1. Book-value inventories ($300,000) are based on the "lifo" method, which leaves in inventory the cost of the oldest or base stock.
2. Current-value inventories are based on current prices derived from first-in-first-out, "fifo", costing, thereby applying most recent prices to inventory on hand.

3. Current land value is based upon market or recent sales in the adjoining area.
4. Book values for buildings, machinery and equipment are stated at cost, and their depreciation reserves are based upon allowable accelerated depreciation methods.
5. Current values for buildings, machinery and equipment are stated at reproduction cost from recent appraisals by a reputable appraisal company. Depreciation reserves are likewise based upon the most recently updated appraisal reports. Acquisitions since the last appraisal date are included at cost, and depreciation is provided on the straight-line basis.

   An advantage to be gained in using reproduction values, as opposed to merely applying current indexes to historical costs, is that these values not only take into consideration the fluctuations in the price index, but also that they are more likely to consider the factor of obsolescence through comparing the utility of the equipment in use with that of the most recent models. Obsolescence is a particularly important factor and even the most reliable appraisal company may not always be able to fully evaluate obsolescence without the assistance of the company's technicians who may be better acquainted with the facts on tooling improvement.
6. Book values for unamortized leasehold improvements are shown at cost less amortization correlated to the expired years of the lease period.
7. Current values for leasehold reflect the present value of higher space rental rates applicable currently in the area of lease, as tabulated below (plus the book values of unamortized leasehold improvements):

Current rental values of leased premises per year	$25,000
Actual lease rental rates per year	20,000
Annual saving	$ 5,000

Remaining lease term at *beginning* of present year — 9 years

Year	*Annual savings*	*6% discount factor*	*Present value of rent savings*
1	$5,000	.9434	$ 4,717.00
2	5,000	.8900	4,450.00
3	5,000	.8396	4,198.00
4	5,000	.7921	3,960.50
5	5,000	.7473	3,736.50
6	5,000	.7050	3,525.00
7	5,000	.6651	3,325.50
8	5,000	.6274	3,137.00
9	5,000	.5919	2,959.50x
		6.8018	$34,009.00xx

x Rounded to $3,000 in Exhibits 1 and 2.
xx Rounded to $35,000 in Exhibit 1.

Note: 6% discount factors are taken from tables of "Present Value of 1," which can be found in numerous textbooks on the mathematics of finance. See *N.A.A. Research Report No. 35,* pp. 99 through 103.

8. Income taxes on current-value basis equal estimated income tax payable (book-value basis) less portion of tax considered to be a prepayment because of current-value operating adjustments ($125,000 minus $15,000).
9. Operating adjustments to balance ($30,000) equals the total current-value adjustments reflected on the profit and loss statement, Exhibit 2. This figure is shown separately on the current-value balance sheet so as not to reflect it in earned surplus or in any other capital equity account, nor in any of the ratio and percentage comparisons later described. Thus, it is possible from year to year to provide a current-value balance sheet with liabilities and capital in agreement with book values except for the effect upon income taxes, surplus due to appreciation, and net earnings.
10. Surplus due to appreciation is equal to current-value appreciation at the end of prior year ($660,000) plus this year's gross current-value increases ($55,000) minus this year's current-value operating adjustments ($30,000).
11. Current-value net income is taken directly from the current-value profit and loss statement, Exhibit 2.

Ratio and percentage comparisons for book values and current values are as follows:

Ratio comparisons	*Book values*	*Current values*
Current ratio	2.06 times	2.35 times
Current liabilities to net worth	45.7%	26.9%
Total liabilities to net worth	65.0%	38.6%
* Turnover of net worth (on sales)	2.41 times	1.46 times
Net sales to inventory	8.33 times	6.25 times
* Net profit (after taxes) to net worth	12.0%	6.4%
* Net profit (after taxes) to total assets	7.3%	4.6%
Net sales assumed at $2,500,000		

* Trouble areas

The current ratio (current assets to current liabilities) is somewhat improved in the current-value presentation of current liabilities to net worth. However, in those comparisons which relate to net sales or net profit, the current-value presentation shows marked declines. The following two comparisons are perhaps the most significant:

1. Net earnings (after taxes) to net worth decreases from 12 percent for book values to 6.4 percent for current values.
2. Net earnings (after taxes) to total assets decreases from 7.3 percent for book values to 4.6 percent for current values.

By use of these ratios, if such conditions did exist, we would conclude that a brand new plant or one purchased with current-value dollars would be earning most inadequate profits. These profits would not begin to repay the risks of an entrepreneur and would not even offer an adequate return on investment. Here, then, is a most significant conclusion because it indicates a need for more volume, higher selling prices, lower costs, or some logical combination of all of these to insure continued life of the enterprise through adequate funding of replacements of fixed assets and renewal of leases at current space values.

Illustration of Modifications—Profit and Loss Statement

The condensed operating statement, Exhibit 2, shows on a conventional basis net earnings after taxes of $125,000. It further illustrates the effect of the following current-value changes for the year:

1. The increase in cost of sales due to the decrease in current-value inventories. This could easily have been a credit under today's rising prices if the number of physical units in inventory were maintained or increased.
2. The increase in depreciation resulting from appreciated valuation of buildings, machinery and equipment, and from different methods of computation.
3. The decrease in present value of leasehold due to the dropping of the present value of the last year's annual rent saving (see tabulation).

Thus, net earnings adjusted to current values show a drop of $30,000, or 1.2 percent of sales. This is partially offset by reduced income taxes of $15,000, with the result that net earnings adjusted to current values (after taxes) is $110,000.

Realistic Showings

Our planning for profits and rate of return is based on pertinent economic data. This has enabled our management to act with confidence in acquiring new machinery, equipment and facilities. Our expectations that they would produce adequate profits on a current-value basis have proved to be realistic. In like manner, our insurance valuations and coverages are realistic and our long-term borrowing requirements have found ready acceptance by loan institutions.

In the face of these benefits it is difficult to understand why the top management of many companies still are content to accept conventional balance sheets and income statements for all decision-making purposes. While it may be true, in some instances, that aberrations in short-range decisions or performance measurements are not significant, they can certainly no longer be ignored in long-range planning or any buy-or-sell decisions.

Fixed Depreciation and Flexible Dollars

by DAVID L. KUNKLER

As PRICES RISE in our economy, the business enterprise is faced with the problem of allocating to current periods the costs of productive facilities acquired at lower prices. At the present time annual depreciation charges are computed on historical costs, that is, on the number of dollars expended in a previous period. This allocation of past expenditures based on the number of dollars expended falls short of measuring the real cost of consuming the long-lived assets. The real or economic costs can be measured only in terms of the current value of the sacrifice made. To apply depreciation computed on past dollars against revenues expressed in current dollars is inconsistent and the earnings reported are nothing more than "monetary income."

This situation lends interest to the following pointed comment:

> "The success of the whole system of business depends on the truthfulness of reports. The truthfulness of reports depends mainly on the truthfulness of accounting. The truthfulness of accounting depends largely upon the truthfulness of the dollar—and the dollar is a liar. For it says one thing and means another."[1]

Accountants have traditionally measured monetary income and economists have attempted to measure real income. Price-level increases in the past twenty years have resulted in material differences between monetary and real income computations. The mis-matching of past dollar costs and current revenue dollars as prescribed under presently acceptable accounting principles does not produce a realistic picture upon which the operating management and investors can rely. The crux of the problem facing accountants today is the basis of allocating or measuring costs.

This article deals with the inadequacies of depreciation charges based on the original cost expressed in current dollars. Common-dollar depreciation charges will be compared to historical-cost depreciation charges of a small hosiery mill for a number of years and the effect on reported income will be ascertained. A

[1] H. W. Sweeney, *Stabilized Accounting*, Harper & Brothers Publishers, New York, 1936, p. XI.

DAVID L. KUNKLER, Atlanta Chapter, 1957, is an Audit Manager in the Atlanta office of Arthur Andersen & Co. Mr. Kunkler was graduated from Lenoir Rhyne College, Hickory, North Carolina, with a B.A. degree. He received his M.B.A. degree from the University of Florida.

hosiery mill was selected as representative of the various manufacturing processes of the textile industry.

Inadequacy of Original Cost as Depreciation Basis

Many accountants agree that price-level adjustments are theoretically correct; however, it is also felt that this cannot be satisfactorily done for accounting purposes. Since there is no perfect method of measuring costs, accountants, in general, have favored the retention of historical costs and have ignored the changing values of the dollar. Is the dollar or any other monetary unit an adequate measure if its value is subject to a wide degree of fluctuations? Real sacrifice (real in the sense of the present value of the past sacrifice) can be measured only in relation to like units of goods and services, and not by the value of a dollar which, in relation to goods and services, varies from year to year.

Normally, the current charges or "out-of-pocket" expenditures are already expressed in terms of current costs. Assuming an even flow of receipts and disbursements, the balances in the nominal accounts could be said to represent fairly the values that were existent throughout the year, expressed in terms of the average dollar. It should be noted that the only expenses not stated in terms of current or real cost are those of the long-lived assets such as plant and equipment depreciation, patent amortization, etc. To be consistent, annual charges for depreciation (and write-offs of other past expenditures) should also be expressed in current units of measure in order to obtain a proper matching of costs and revenues. Current accounting statements prepared under generally accepted accounting principles are deficient in measuring cost consumption, and accountants are failing to do the job they purport to do—to properly match costs and revenues.

The definition of depreciation accounting under generally accepted accounting principles is the allocation of the original cost of a capital asset over its useful life. The periods receiving the benefit or the revenues produced as a result of using the asset are charged with a portion of the original cost relating to the benefits received. This allocation affects the over-all matching of costs and revenues for this period. The problem, then, is not the principle of depreciation but how the original cost is measured.

Common-Dollar Depreciation

Common-dollar depreciation results in a proper matching of current revenues and depreciation charges expressed in dollars of equal or "common" value. It adjusts charges for depreciation, as presently computed, to the current price level,

so that current operations are charged with the current value of fixed asset consumption.

The price level increase has been relatively insignificant over the past ten years on a year-to-year basis. Both salaried and hourly workers have, in most cases, received wage increases which have more than offset the increase in consumer prices. The cumulative effect of these increases (aproximately 24 percent) is, however, evident to the investor who has placed his funds in fixed-return investments such as bonds, annuities, etc., for the dollars he receives today are not as valuable as those invested in previous years. For example, the investor who purchased savings bonds in 1949 for $75 and received $100 in 1959 had a real income of only $6.70 for the ten-year period. The $100 received in 1959 had a purchasing power of only $81.70 when expressed in 1949 dollars. And yet, according to generally accepted accounting principles, a $25 income would be reported (and taxed) for the ten-year period.

As illustrated above, the dollar is merely a unit of exchange and has no value in itself. Its value is only in relation to the goods and services it can command. Consequently, as prices rise, the purchasing power of the dollar decreases. This decrease in value poses a problem for the business enterprise which has invested large sums in long-lived assets and charges current depreciation charges in amounts not adequate to allocate the "real" cost of the fixed assets absorbed in current operations.

This understatement of depreciation results in an overstatement of reported earnings (and may result in income taxes and dividends being paid from nonexistent, "paper" profits). Therefore, current statements, as certified by the independent public accountant, may not present fairly the results of operations. Proper presentation of results of operation may be obtained through the application of common-dollar adjustments to the normal depreciation charges so as to make the annual charge equal, not in the number of dollars, but in purchasing power.

How Common-Dollar Adjustments Are Applied

In the application of common-dollar adjustments, depreciation charges based on historical costs are adjusted by the use of a general index or one that measures the purchasing power of the dollar. For this study, the Consumer Price Index[2], which is published by the Bureau of Labor Statistics, was chosen. This index is published monthly and measures, approximately, the purchasing power of the dollar.

[2] "Consumer Price Index," *Monthly Labor Review*, published by the U. S. Department of Labor, Bureau of Labor Statistics.

Why was a general index chosen rather than a specific index? As previously discussed, the basic measurement of cost is based on sacrifice. When owners decide to invest their funds in the business, present consumption is sacrificed and the only suitable way to measure this sacrifice is in terms of consumer goods or by the use of a consumer price index. The investors' sacrifice could not be measured in terms of building or construction costs etc. (specific indices) but rather in terms of the alternative uses to which they could have placed their funds. To use a specific index relating to the specific assets being depreciated would measure what the investors received, not what they gave up. If a specific index is used, the basis does not logically seem to be that of sacrifice but that of replacement, and the replacement of assets is not an accounting problem.[3]

Common-dollar depreciation is the product of the depreciation charge computed on a historical cost basis multiplied by a fraction, the numerator of which is the average consumer price index for the current year and the denominator is the average consumer price index at the date of acquisition. This fraction, or adjustor, converts the normal depreciation charge to a common-dollar charge equal to the current year's portion of purchasing power expended as acquisition.

For example, assume that the ABC Hosiery Mill acquired $50,000 of knitting equipment on January 1, 1950, and this equipment is being depreciated over a ten-year period, or at 10 percent annually. A comparison of the depreciation charges computed by the company and those computed using common-dollar techniques follows:

Year	*Depreciation*	*Adjustor*[1]	*Common-dollar depreciation*	*Effect on income*
1950	$ 5,000	102.8/102.8	$ 5,000	—
1951	5,000	111.0/102.8	5,399	(399)
1952	5,000	113.5/102.8	5,520	(520)
1953	5,000	114.4/102.8	5,564	(564)
1954	5,000	114.8/102.8	5,584	(584)
1955	5,000	114.5/102.8	5,569	(569)
1956	5,000	116.2/102.8	5,652	(652)
1957	5,000	120.2/102.8	5,846	(846)
1958	5,000	123.5/102.8	6,007	(1,007)
1959	5,000	124.6/102.8	6,060	(1,060)
	$50,000		$56,201	$(6,201)

(1) The adjustor represents the average Consumer Price Index for the current year, divided by the average index at the year of acquisition.

[3] "Relationship between Depreciation Allowance and Maintenance of Capital during Inflation," John E. Kane, *Journal of Accountancy*, December, 1952.

As illustrated above, the company's depreciation charges were not sufficient to cover the real cost of fixed-asset consumption, which resulted in an overstatement of reported income of $6,201. This understatement of real cost results in an erosion of capital through the overstatement of earnings from which income taxes and dividends are paid.

Adjustments Applied to the ABC Hosiery Mills

The ABC Hosiery Mills, Inc. is located in the Southeastern United States and the majority of the capital stock is owned by one family. The mill was incorporated in 1914 and has been in continuous operation since that date. Its total assets at December 31, 1959, were approximately $4,000,000. The productive facilities of the company consist of three hosiery mills, a box factory and a steam plant, acquired at various dates since inception.

In computing the common-dollar depreciation, the depreciable assets were grouped by type and year of acquisition and common-dollar adjustments for the period 1949 through 1959 inclusive were applied as illustrated above. A listing of the price indices used follows:

CONSUMER PRICE INDEX—ALL ITEMS[4]

(*1947-49=100*)

Year	*Index*	*Year*	*Index*
1949	101.8	1955	114.5
1950	102.8	1956	116.2
1951	111.0	1957	120.2
1952	113.5	1958	123.5
1953	114.4	1959	124.6
1954	114.8		

A comparison of the common-dollar depreciation and the company's depreciation provisions and resulting income adjustments for the selected period is shown below:

[4] Consumer Price Index, *op. cit.*

ABC HOSIERY MILLS, INC.

DEPRECIATION ADJUSTMENTS—1949-1959

Year	Depreciation Provision: Common-dollar	Depreciation Provision: Historical cost	Income overstatement
1949	$ 158,513	$ 123,946	$ 34,567
1950	162,421	130,348	32,073
1951	178,438	139,375	39,063
1952	145,792	116,891	28,901
1953	117,059	97,720	19,339
1954	120,706	103,998	16,708
1955	133,146	119,942	13,204
1956	153,559	139,256	14,303
1957	158,395	140,019	18,376
1958	164,827	143,050	21,777
1959	191,728	169,891	21,837
	$1,684,584	$1,424,436	$260,148

The income overstatements and their effect on reported income, before Federal and state income taxes, are shown below:

ABC HOSIERY MILLS, INC.

INCOME ADJUSTMENTS—1949-1959

Year	Reported income (before taxes)	Income overstatement	Adjusted income
1949	$ 308,732	$ (34,567)	$ 274,165
1950	540,477	(32,073)	508,404
1951	439,057	(39,063)	399,994
1952	392,007	(28,901)	363,106
1953	201,997	(19,339)	182,658
1954	222,364	(16,708)	205,656
1955	95,536	(13,204)	82,332
1956	204,799	(14,303)	190,496
1957	249,466	(18,376)	231,090
1958	233,029	(21,777)	211,252
1959	289,209	(21,837)	267,372
	$3,176,673	$(260,148)	$2,916,525

The cumulative effect of the income overstatements for the eleven-year period is 8.19 percent of reported income before taxes or 16.38 percent after taxes, assuming an average tax rate of 50 percent for the period.

Most accountants would agree that a 16-percent overstatement of net income

is material. Was the management of the ABC Hosiery Mills, Inc. aware that reported income for the above period had been significantly overstated? Undoubtedly, in determining the amount of dividends to be paid to shareholders, the directors would rely on the income as reflected in the audited financial statements. For example, assume that the company had adopted the policy of paying out 70 percent of net earnings in dividends and retaining 30 percent for expansion and replacement of the physical properties. While not paid out in dividends, the income adjustment of 16.38 percent would greatly reduce the earnings retained in the business as follows:

Earnings, 1949 through 1959, before income taxes	$3,176,673
Provision for Federal and state income taxes	1,588,336
Net income	$1,588,337
Dividends paid	1,111,836
Earnings retained in the business	$ 466,501
Excess of common-dollar depreciation over recorded depreciation for the period	260,148
Real earnings retained in the business	$ 206,353

As illustrated above, management's desire to retain 30 percent of the net earnings for reinvestment was not accomplished. After inflation took its bite, sufficient funds were not available to carry out management's program of expansion and replacement of the productive facilities.

Summary and Conclusion

The effect of common-dollar adjustments on a given enterprise will vary with the relationship of depreciation charges to total expenses and income. Obviously, in a public utility where the depreciable plant is the major item on the balance sheet, common-dollar adjustments, if applied, might result in significant adjustments to reported income. For example, the Sacramento Municipal Utility District now accrues depreciation on fair value.[5] Its annual report for 1957 contained the following statement:

> "The District accrues depreciation on its properties according to the straight-line method, based on engineering determination of the service lives of the individual property units. In 1957 the District adopted with the full approval of its independent auditors, Arthur Andersen & Co., the principle of providing depreciation based on the fair value of its property. In periods of substantial inflation or defla-

[5] The Management Newsletter, "SMUD: Fair Value Depreciation," *Electrical World*, January 5, 1959.

> tion, because of changes in the purchasing power of the dollar, depreciation based on cost is not a fair measure of the property consumed in operations. This principle of accounting, sometimes referred to as 'price level depreciation', recognizes that a utility should collect in revenues an amount to cover the fair value of its property in operations if the real capital dedicated to the business (which for the District is its customers' equity) is to be maintained."[6]

This additional "fair-value" increment represented an increase of approximately 45 percent for depreciation charged to operations in 1957. The offsetting credit was to "Accumulated Price Level Depreciation" in the surplus section or "Customers' Equity Employed in the Business." Due to the heavy concentration in fixed assets, the adoption of fair-value depreciation by utility companies in general might well result in similar adjustments.

In the case of the ABC Hosiery Mills, Inc., the depreciable property represents about one-third of the total assets, which is generally in line with manufacturing companies producing salable inventory items. The cumulative income overstatement of 8.19 percent before income taxes or 16.38 percent after income taxes is indicative of the adjustment that might be revealed by the adoption of common-dollar depreciation techniques by any manufacturing concern that has been in operation for a number of years.

Price-level adjustments have been widely discussed by the accounting profession for many years and many opinions, pro and con, have been expressed, but as yet no definite approach has been taken. Generally speaking, most accountants are taking a "wait and see" attitude toward the problem. It is true that the adjustment for one year may not be material; however, the cumulative effect of the increasing price level over the past twenty years may prove to have been startling.

Many companies are continually engaged in negotiations involving labor disputes that arise from wage demands resulting from cost-of-living increases. Unions demand wage increases to adjust compensation for decreases in the purchasing power of the dollar and cite reported earnings of the employer, which, oddly enough, are reported on a historical cost basis. We are all aware that the decrease in purchasing power affects the employer as well as the employees. For this reason, the use by management of common-dollar depreciation in reflecting the real earnings of the business would place the demands of labor and management on a comparable basis.

We all know that economic income will not result by merely adjusting the depreciation charges for a particular company. However, since long-term invest-

[6] *Ibid.*

ments, such as fixed assets, are most affected by price-level changes, an adjusted depreciation charge expressed in dollars, that is comparable to the current income and expense accounts, will result in a more accurate matching of costs and revenues, and the end product will be closer to the real or economic income of the business enterprise.

If consistently applied, common-dollar depreciation will allocate properly the real cost, which is the historical cost adjusted to meet the changing price-level. The equality of the annual depreciation charges will be in terms of the purchasing power of the dollar—not in the number of dollars. The result is that depreciation charges will be expressed in the same unit of measure as the other income and expense accounts in the operating statement.

Where Out-of-Pocket Costs Make the Best Transfer Price

by ROBERT McMURRAY*

THE THEORY and application of pricing for interdivisional transfers has been a popular topic in recent accounting literature. For the most part, these articles are confined to cases where decentralized operations and profit-center-control systems prevail. But this is not the only situation. The following is submitted as a simple but effective solution for interdivisional pricing where profit responsibility is not decentralized but where heavy emphasis is put on sound budgeting and cost control in each division.

Our company, which publishes nationally circulated magazines and books, is organized on the basis of functional divisions. For instance, there are separate divisions responsible for selling advertising space units, for circulation, for selling books, and for manufacturing the magazines, together with several others. Each division manager is held responsible for the successful performance of his particular function and is expected to hold expenses within a predetermined budget. No income statements or balance sheets exist at this level, so that measurement on the basis of a return on sales or on capital investment is not possible. Nevertheless, an internal pricing policy has always been important to us because the three sales divisions (advertising sales, book sales, and ciruculation) use advertising space in our own publications; in effect they buy the service and material from the manufacturing division.

When determining the policy for regulating internal transfer prices (which become charges to the customer departments and credits to manufacturing) we were guided by concern for three primary criteria:

1. Consistency of divisional and over-all company objectives.
2. Development of cost and budget consciousness.
3. Practicality and ease of the accounting treatment.

* Analytical Accountant with the Controller's Staff of the Meredith Publishing Company, Des Moines, Iowa.

Aside from a purely arbitrary price which can lead to internal disputes and tends to undercut responsibility for cost control, we had immediate access to three bases on which to set a transfer price. They were:

1. Market price—the company's advertising rate to outside customers.
2. Full cost—the standard direct manufacturing cost plus a markup to cover overhead.
3. Marginal cost—the out-of-pocket cost of running the advertising unit (at standard).

Through a combination of trial and error and analysis, we have arrived at marginal cost as a basis for internal pricing. Experience has demonstrated that this system is best able to meet the criteria set out above.

Returning briefly to these criteria, the most important consideration in setting an internal price is to make sure of the consistency of company and division interests, particularly in the analysis of make-or-buy problems. Market or full cost-based pricing obscures the true cost differential in make-or-buy decisions. For instance, the decisive factor in a circulation decision to advertise in an outside magazine may be the lower price quoted by another publisher. If, however, the internal marginal cost were actually lower than the outside price, the company would find itself the net loser in terms of funds expended. Using the marginal cost as a basis for transfer will avoid this conflict of interest.

The second criterion, the effect on cost responsibility, is also of major significance. It should be remembered that users of internal advertising copy are not measured by a return on sales but on the basis of a predetermined expense budget. In practice, charging an overhead or a profit markup may simply induce the using department heads to budget a higher cost for each anticipated purchase. In fact, there is a tendency for these customers to think of any internal markup as fictional. If attitudes like this are permitted to develop, the idea of cost consciousness may be weakened at the very level of management responsibility where it can serve the greatest purpose. In this important area, too, it is felt that marginal pricing offers the best solution.

Ease of the accounting treatment provides another advantage in using marginal pricing. Under normal conditions in our plant, the marginal cost is limited to direct cost of labor and material increments. Hence a credit to the appropriate manufacturing or inventory account, with an offsetting charge to the customer departments, is enough to record the transaction. Use of full cost would entail additional credits to noninventory overhead accounts and, should the market price be used, closing entries would be required to eliminate the profit.

As many writers on the subject have pointed out, there is theoretical and practical justification to set internal price levels at market when profit centers are involved. In these cases, marginal pricing can obscure income statements (by affecting the return on sales of both seller and buyer) and distort inventory balances. However, in cases where the transfer of goods for resale is not involved and where divisions are primarily functional and operate as cost centers, these objections to marginal pricing lose validity. In such an organization, the use of marginal-based pricing fulfills each one of the foregoing criteria and, consequently, is able to provide the most effective guide for the internal transfer of goods and services.

Replacement Values in Practice— The Example of Austria

by FELIX P. KOLLARITSCH

ACCOUNTING LITERATURE in the United States since the end of the second world war shows repeated reference to inflation and its effects on accounting and on the correctness and reliability of the financial statement. Solutions that have been offered to the problem of inflation vary from a complete annual revaluation of all balance sheet items and costing at replacement values to the adjustment of only a few costs in the income statement. Many suggestions lie between these two extremes. So far, however, almost all of the discussions of solutions have been only on a theoretical basis, which has left them open to numerous objections.

Among the objections to any revaluation as a solution to the problem of inflation, the following are most frequently mentioned:

1. The "guessing at" or estimating of replacement values or any other current value is beyond the task of the accountant.
2. In our technological era, replacement in kind takes place only to a very limited extent, if at all, which makes a revaluation impossible.
3. Any deviation from cost would open the door to misrepresentation in financial statements.
4. For administration, any such move would involve so much clerical work it would be economically unfeasible, if not impossible.
5. Under no circumstances can revaluation be justified.

These objections are all assumptions based on theoretical conjecture. This writer undertook during the summer of 1960 to study an actual and complete revaluation now in operation which was based on replacement values, and to compare the findings with those objections commonly raised. This study, made in Vienna,

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DR. FELIX P. KOLLARITSCH, C.P.A., is Associate Professor of Accounting with Butler University, Indianapolis, Indiana. Besides teaching, he does consulting work in the accounting and managerial fields. Dr. Kollaritsch holds M.B.A. and D.B.A. degrees from the University of Vienna College of Business Administration.

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Austria, dealt with the recent revaluation made by the Austrians toward the end of the period of extreme inflation following World War II.

Experience of the Inflationary Period

From 1947 to 1954—in some instances even beyond that time—the Austrian government had to introduce many new methods and institute unprecedented tax relief measures to eliminate from the profits shown in the accounting records those which were wholly due to inflation (phantom profits). The measures passed were made necessary because the nine-year period from 1945 to 1954 had been a period in which the over-all wholesale price index increased from 105 to 839, with no uniform pattern shown in the tremendous price jumps. The actual inflation in the country was even more serious than the figures would indicate, since many prices included in the index were regulated by law and had ceilings; also, the currency had to be revalued twice during this period.

As the Austrian accounting system, like its American counterpart, operates on the cost principle, the relation between cost and revenue was completely distorted, especially where fixed assets were involved. The great danger of the inflation was not only that all the real profits would be drained away by taxation but that taxation of the substance would decrease the nation's productive capacity and would thus completely destroy all individual initiative and lead to economic chaos. The Austrian economist, Richard Kerschagl, in summing up the purpose of the accounting system, says: "Of special importance to the economist is the assurance that the accounting method will not allow an unknown decrease in the substance of the enterprise."[1]

The different tax provisions which had to be introduced during the period from 1947 to 1954 to eliminate the portions of book profits that were due to the inflation have been discussed in a previous article.[2] By the year 1954, a year when prices and production were at last generally stabilized, accounting for the purpose of determining taxes had become extremely difficult and cumbersome. A multitude of rules, laws, regulations, dates, etc., had to be observed which made the preparation of tax returns so complicated that for several years the request had been made by C.P.A's as well as business and industry that a complete revaluation be allowed for tax purposes that would not result in disadvantages to those doing the revaluing.

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[1] Dr. Richard Kershagl, "Neuordnung der Bilanzen und Volkswirtschaftliche Probleme," *Oesterreichischer Betriebswirt,* 1951, p. 141.

[2] Felix P. Kollaritsch, "Austria's Answer to Inflationary Profits and Taxation," *The Accounting Review,* July, 1961.

This idea was by no means a new one. In the year 1925, after the first world war, inflation made it necessary to revalue on a gold basis. In 1938, after occupation of Austria by the Germans, accounts had to be revalued and restated on the basis of the German currency. Following the second world war, other nations had already been forced by inflation into revaluation. Germany, which made a faster and stronger recovery than almost any other European nation, undertook the revaluation of balance sheet items in the year 1949. However, in Austria it was not until 1954 that the currency and over-all economic condition could be considered as being stabilized sufficiently to assure the successful outcome of a revaluation of balance sheet items. It was, therefore, in 1954 that the Austrian federal law No. 190/1954 was passed. This law permitted the revaluation of all balance sheet items, with only a few exceptions. The revaluation resulted in bringing accounting data to reflect more accurately actual economic conditions, thus enabling management, creditors, owners, etc., to use the information generally supplied by accounting records without cumbersome adjustments which, by the old procedures, were unavoidable.

This article discusses the revaluation which took place in Austria, in two sections:

1. The revaluation law itself with all its relevant provisions.
2. The practical application and the effects of the law.

The Revaluation Law or "S.E.B.G."

"S.E.B.G." is the abbreviation for the German word *Schillingeroeffnungsbilanzgesetz,* which literally translated means "schilling-opening-balance-sheet law." In this article we will refer to it as the Revaluation Law. According to this law, companies could, at their election and as of a certain specific date, revalue all balance sheet items (with a very few exceptions as specified later) without sustaining any disadvantages in the form of additional taxes. Considering the complexity of carrying out such an action, it is surprising to note that the revaluation law itself is relatively short—having only 56 paragraphs and keeping ambiguities at a minimum within this framework.

Assets and the Revaluation Law

In general, the maximum value that could be attached to an asset to be revalued was its replacement value as of the day for which the new revalued balance sheet was prepared. It was recognized by the lawmakers that a replace-

ment in exact kind is not always possible or feasible, so in cases where an asset could not be given a replacement value in kind, the law was worded so as to allow the usage of replacement costs of assets which were "similar in use and capacity."[3] This revaluing of assets according to replacement values of assets which were similar was not restricted to items that appeared to have increased in value but was also forcibly applicable to assets that were shown at overstated values. These inflated values had to be reduced, except in such cases as the law provided specific provisions for the continuance of the overstated amounts.

Although the Revaluation Law was primarily and generally based on replacement values, certain exceptions were made in it. These included valuation of certain specific items at prevailing selling prices, allowance for the continuation of higher book values in some instances, disallowance of the revaluation of other specific items, requiring an adjustment for other categories of assets which were revalued at replacement costs. For example, buildings and their lands were to be valued at current sales values. Their value had to be established with the assumption that the whole business was to be sold as a unit, not piece-meal. Should the book value exceed the current sales value, it could then, upon the election of the taxpayer, be retained in the books. Land without any buildings on it had to be valued at replacement values.

Replacement values had to be used for fixed depreciable items other than buildings. However, from the established value an amount had to be deducted or put into an appropriate allowance account, corresponding to depreciation charges on the new value that would have been made from the date of purchase until the date of revaluation. Fully depreciated items which were still in use and which had a service lifetime exceeding ten years, as well as assets not yet fully depreciated but which had been in use for ten or more years, could at the election of the taxpayer be valued by one of the following three methods:

1. Valuation at 30 percent of the replacement value—no adjustment would then be needed for depreciation from the time of acquisition.
2. Retaining of the former book-value of the depreciable items.
3. Valuation according to the general program described above (replacement value, less the corresponding depreciation adjustment).

Fixed assets purchased during 1953 and 1954 and in any later accounting period could not be revalued. Also, no intangible assets could be revalued, regardless of the date of their acquisition. The new asset values as permitted under the Revaluation Law were to be used as the cost basis for any future tax or accounting purpose.

[3] Federal Law No. 190/1954, para. 4/1.

Liabilities and the Revaluation Law

Liabilities could also be revalued at the election of the taxpayer, with the revaluated liabilities to be shown in the books at amounts needed to cover them. The need for this provision becomes understandable when one realizes that in the years prior to 1954 it was not an uncommon practice to correlate liabilities with the price of gold; in some instances the price of flour, sugar, tobacco, or some other staple was taken as the basis for determining liabilities in credit contracts. This using of the price of gold, etc., to determine liabilities in credit contracts was entirely contrary to the method of determining liabilities in the books, where they were kept on a cost basis; therefore, the accounting records gave a completely unrealistic picture of financial position. The provision concerning liabilities was very liberal, however, setting only a compulsory minimum which left it to the discretion of the taxpayer to continue liabilities at higher values if they had been previously so recorded.[4] When the higher values of the liabilities were continued, hidden reserves were formed (a practice for which European accounting systems are noted).

Equity Adjustments

Because such varying opinions prevail in the U. S. as to the possible treatment of revaluation surpluses, the section of the Revaluation Law dealing with these surpluses may be of special interest. The discussion here will deal primarily with corporations, with only a brief reference to sole proprietorships and partnerships, since the equity accounts of the latter two required only simple adjustments. In the case of proprietorships, credits resulting from revaluation generally went directly or via a summary account to the capital account of the owner. Where partnerships were involved, credits were placed in the capital account according to the profit and loss ratio. In both cases, withdrawals could be legally made from these amounts at the election of the proprietor or, in the case of a partnership, in accordance with the articles of partnership.

Since the capital structure of corporations is not only more extensive than that of a sole proprietorship or partnership but also varies considerably among the different incorporated entities, the section of the law dealing with the disposition of revaluation surpluses had to be more detailed and flexible in their case. The different kinds of preferred and common stock had to be taken into

[4] Johann Pucharski and Walter Kastner, *Kommentar zum Schillingeroeffnungsbilanzgesetz,* Manzsche Verlags und Universitaetsbuchhandlung, Wien, 1954.

consideration, with their differing interests in the revaluation surplus. The main provisions of the law for this purpose are:

1. The difference between the equity (capital) before revaluation and the equity after revaluation, determined by deducting from the revalued assets the revalued liabilities, could be credited to a legally restricted "revaluation surplus account."
2. At the election of the board of directors, this difference could also be credited directly to the capital account of common stock issued where there was only one kind of stock outstanding. If there were several kinds of stock outstanding, such as several different common stocks, or some common and some preferred stock, the credits had to be distributed in such a way as to maintain the proportional capital claims of each class. To assure the proper distribution of these revaluation surpluses, a general stockholders meeting had to be called, at which a majority of the shareholders had to give approval to the suggested proportionment. Any stockholder or group of stockholders holding at least 5 percent of the total capital could, upon proving hardship, ask for a court decision on the matter of revaluation surplus distribution.
3. A combination of the two methods mentioned above—namely, a partial distribution into a legally restricted revaluation surplus account with the difference applied to capital account or accounts, as the case may be—was possible, provided that the proportionate claims of the different kinds of stockholders were not changed in favor of any one group.
4. Another possibility allowed under the law was that a portion of the credit could be given to earned surplus, with the rest being distributed in any of the three above-mentioned ways, at the election of the company. To safeguard against any ill-usage of this privilege, two strict limitations upon the amounts to be credited to a free-earned-surplus account were established in this law. First, the ratio of capital (including all other surpluses except free-earned surplus) to free-earned surplus could not be changed in favor of the latter. The following simplified example is given as an illustration:

CAPITAL SECTION OF BALANCE SHEET (IN $1,000)

Before revaluation		*%*	*After revaluation*	*%*
Paid-in capital	$ 1,000	50	$ 3,000	50
Legally restricted surplus	200	10	600	10
Free-earned surplus	800	40	2,400	40
	$ 2,000	100	$ 6,000	100

Assuming a $4 million increase in net assets due to revaluation in the above example, and an original ratio of 3:2 (other capitals to free-earned surplus), the maximum transfer to earned surplus would be restricted to $1.6 million.

The second limitation was that the ratio of the legally restricted surplus to free-earned surplus also could not be changed in favor of the latter. Observing the limitations given above, this meant that an increase in the free surplus had to be accompanied by a proportionate increase in the legally restricted surplus. As an illustration, using the above example, if this company had increased its legally restricted surplus to only $400,000 from the original $200,000, earned surplus could not have been increased beyond $1,600,000 without violating the law, by changing the original ratio of the two of 1:4 in favor of earned surplus.

This last provision made it possible, of course, for corporations to actually distribute part of the amounts due to revaluation, although the law specifically prohibited such an act. Since, however, the same relationship between capital and free surplus had to be maintained, it was not considered that amending the restriction on distribution would endanger the enterprise. As will be shown later, a credit to free-earned surplus was a rather uncommon practice.

Practical Application and Effects of the Revaluation Law

A major obstacle in America, to the development of any accounting system recognizing inflation, regardless of necessity or desirability, is the understandable reluctance of the members of the accounting profession to have to estimate replacement values. The Austrian experiment recognized this difficulty, along with the pressing need for changed values, and put the burden of this task where it belongs—with the professional, licensed appraiser who, upon completion of the revaluation, issued a certificate. After approval by the Internal Revenue Service, these newly established values were considered as the cost basis for any future accounting or tax purpose.

Since these values were subject to approval and possible audit by the Internal Revenue Service, due care seems to have been exercised by appraisers in deciding upon a true and correct new value. That this method of establishing values was successful is indicated by the relatively few disputes which reached the courts and by published statistics. A study undertaken by this writer of numerous revalued balance sheets substantiates also that appraisers were careful and fair. As a matter of fact, in many instances a rather conservative attitude was taken and many assets were not revalued at all; some others were listed at a value far short of the maximum allowed under the law. In a number of instances, this author

observed that no revaluation of the current assets had taken place. In other cases, particularly with respect to nondepreciable fixed assets, certain companies hesitated to apply the maximum allowed by the law.

An important, generally overlooked, factor in connection with asset revaluation was brought out by the Austrian experiment: In general there is a built-in safety valve inherent in most corporations against fraudulent overvaluation, since by their very nature, most corporations have to make profits and distribute at least part of them to stockholders. Overvaluation would, of course, work against the showing of profits. To quote Austrian Professor Bouffier: ". . . profits and dividend policies caused corporations to desist from taking advantage of the maximum values allowed under the law, and led to a purposeful undervaluation."[5] The gaining of profits, after all, is essential for the building up of capital, without which a corporation could not exist.

Another indication of the deliberation, thought and caution that was taken in making the revaluation, as well as an indication of the general intent on the part of the businessman in this matter, can be found in the timing of the revaluation. According to the law, the earliest date when a revaluated balance sheet could be established was the end of the fiscal accounting period 1953-54. The beginning of this fiscal period had to be on or after May 4, 1953. However, most corporations did not take advantage of this timely privilege the first year but converted their balance sheets in the year 1955. Corporations could continue to take advantage of the concessions made by the Internal Revenue Service to eliminate from book profits those parts which were due to inflation, until they revalued their balance sheets. Had there been intent by the businessmen to make considerable overvaluation in order to gain substantial tax advantages, no sound justification for delay could be made. The importance and need for a correct and sound accounting system was thoroughly impressed upon all Austrian businessmen during the years of extreme inflation and, no doubt, guided them in their actions.

The legal alternative treatments of the credits caused by revaluation that were discussed in an earlier section need analysis here according to their actual disposition. In almost all instances these previously mentioned credit amounts were credited to the capital accounts. In addition to those credits, many companies were able to relieve the effects of inflation which caused top-heavy earned surplus by transferring substantial parts of this surplus to capital. These transfers from earned surplus to capital, usually taxable in the same way as

[5] W. Bouffier, *Die Auswirkungen der Schillingeroeffnungsbilanz auf Kosten und Preisbildung*, Betriebswirt, 1954, p. 182.

a dividend distribution, were tax-exempt under the Revaluation Law. It was the combination of these two credits that made a few extreme capital increases possible, which in one instance ran as high as 50 times,[6] and in another case 60 times,[7] the original capital balance. The following statistics, which are included to show the influence that the kind, age and capitalization of a business had on the revaluation, also show that, in general, revaluations were not excessive, particularly when these capital increases are compared with the wholesale index increase that had taken place:

CAPITAL INCREASES THROUGH REVALUATION (BY KINDS OF BUSINESS)[8]

(CORPORATIONS ONLY)

Kind of business	*No. of corporations*	*Ratio of increase in capital*
Industry	274	4.4
Trade	57	4.5
Banking & insurance	34	3.5
Transportation	34	2.1
Hotels & restaurants	21	5.0
Others	12	1.8
	432	4.2

CAPITAL INCREASES THROUGH REVALUATION AS TO AGE OF BUSINESS[9]

(CORPORATIONS ONLY)

Year of incorporation	*No. of corporations*	*Ratio of increase in capital*
Until 1913	134	5.7
1914-1937	218	6.1
1938-1945	18	3.8
after 1945	62	2.1
	432	4.2

[6] Rotax Werk, A. G., (Machine Builder).

[7] Kaufhaus A. Gerngross, A. G., (Department Store).

[8] *Die Schillingeroeffnungsbilanz der Oesterreichischen Aktiengesellschaften*, Kammer der gewerblichen Wirtschaft fuer Wien, Wien, 1959, p. 7.

[9] *Op. cit.*, p. 11.

CAPITAL INCREASES THROUGH REVALUATION AS TO SIZE OF BUSINESS[10]
(CORPORATIONS ONLY)

Size of capital	*No. of corporations*	*Ratio of increase in capital*
Below 1 Million	69	1.3
1 to below 5 Million	130	2.5
5 to below 10 Million	54	2.9
10 to below 30 Million	80	4.3
30 to below 100 Million	66	4.8
Over 100 Million	33	4.3
	432	4.2

One loophole in the law which theoretically defied the very purpose of the law, but which no one took advantage of, to this writer's knowledge, was that the revaluation credits could be disposed of at the election of the taxpayer on a ratio basis to capital, to paid-in surplus and to free-earned surplus. This unintentional mistake by the lawmakers is particularly glaring in the light of the knowledge that earned surplus has for years been credited excessively with inflationary—not economic—profits which have caused it in some instances to be a multiple of the paid-in capital. Since earned surplus is supposedly made up of retained earnings and a mere realistic restating of the assets in terms of a less valuable currency could not produce a profit, the usage of this part of the law, which evidently overlooked this fact, would have resulted in an even more unrealistic capital section of the balance sheet than had been the case up to that time. It would have resulted in an even greater increase in earned surplus. As has been pointed out before, most companies realized this shortcoming and transferred substantial parts of their earned surplus to capital. After completion of the disposition of credits caused by revaluation, the old stock certificates were recalled and cancelled, and new ones were issued with an increased par value.

Prior to the actual restatement of the balance sheet, one of the most controversial points pertaining to the effects of a revaluation was the fear expressed by some Austrian writers that this action would result in considerable price increases. They had, of course, not taken into consideration that, even long before any revaluation law was considered or passed, pricing and costing policies were based on actual values rather than on the figures in the books that were misstated because of the inflation. In reality, all the revaluation did was to reconcile the account figures, which through the rapid decrease of the purchasing power of the currency had become quite unrealistic, more closely to actuality—

[10] *Op. cit.*, p. 13.

to those values which of necessity were already being used by management for establishing prices and making major policy decisions. Therefore, it should have come as no surprise that the general price increase feared by some did not take place and that, in the few instances where the price level did rise, this could not be directly associated with the revaluation.[11]

Some Conclusions

The above is, of course, only a brief description and analysis of the Austrian Revaluation Law. A complete and exhaustive treatment of it has been avoided to keep the article short and to highlight those points in the law and in its practical application which, as American accounting literature would indicate, are the most controversial ones in a revaluation plan. Findings made from this study would suggest the following conclusions:

1. Revaluation of accounting data became necessary under the special economic circumstances of Austria's extreme inflation.
2. The responsibility for establishing replacement values was not given to the accountant but to professional appraisers.
3. Even in our time of rapid technological advances, replacement in kind can be made in the majority of cases.
4. It is possible to design a revaluation law flexible enough to include those few items which cannot be replaced in kind.
5. Replacement values can be established intelligently within certain limits.
6. Intentional misrepresentation, in the form of overstating replacement values, was negligible.
7. To Austrian businessmen, correctness of the accounting data took predominance over possible future tax advantages.
8. The kind, age and size of an enterprise had a marked effect on the revaluation of its accounts.
9. The credits resulting from revaluation should be applied either to capital or to restricted surplus, and the mistake made in Austria of allowing part of it (even if only a small portion) to be credited to earned surplus must be avoided.
10. The Austrian experiment proved that it is economically as well as practically feasible to revalue assets and adjust the books.
11. The revaluation eliminated the need for two sets of records, one on the cost basis for legal and tax purposes, the other on the current value basis for pricing, costing, etc.

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[11] W. Bouffier, *Preisbildung und Preispolitik nach der Schillingeroeffnungsbilanz.* Betriebswirt, 1955, p. 167.

12. Investors and others not directly connected with a business could again obtain reliable financial reports which could be analyzed quickly with a minimum of adjustments.

All in all, it must be said that for the Austrian businessman—whether it were owner, manager, accountant—as well as for the outsider, bank, unions, government, etc., this revaluation was necessary, and the results were beneficial far beyond the most optimistic hopes.

A Company Course in Cost Control

by GEORGE L. CARAWAY, JR.*

THE SHORT ARTICLE "Speak the Language" by Carl M. Koontz in the April 1961 issue of the *N. A. A. Bulletin* is most interesting. I earnestly agree that presenting accounting reports in a "down to earth" and comprehensive manner is an absolute necessity if they are to be clearly understood. For many years our company has recognized the importance of effective accounting communications and has made a concentrated effort to improve the clarity of letters, reports and conversations by which accounting information is conveyed.

This problem has also been approached from another angle. Periodically, a cost control course is offered to all levels of management from assistant department foremen to mill superintendents and, also, to members of staff departments such as production control and standards departments. Each course covers a ten-week period consisting of one two-hour class each week. A very comprehensive manual has been developed by the controller's department and the training department for use as our textbook. These classes are conducted by a member of the controller's department. Some of the phases of cost accounting covered in the course are: standard labor and burden budgets, standard costs, inventory control, labor and supply reports, and profit and loss statements. During the course, theoretical labor and burden budgets are prepared, yarn and fabric cost sheets are calculated, and labor and supply reports are prepared showing variances from standard.

The men who take this course are not expected to become cost accountants after just twenty hours of instruction in the basic fundamentals. However, when they complete the course, they do know the meaning of cost accounting terms such as over and under-absorbed burden, labor and burden distribution, and usage and supply variances—a knowledge often absent in production staff departments.

Prior to the initiation of the cost control course, we were handicapped by the fact that it was often very difficult to explain our control reports to supervisors and foremen. Now, however, we find the task much easier because the men to whom the reports are sent have a better understanding of them. So now, in Mr. Koontz' words, we speak the same language. Further, as a result of these courses, plus the fact that more emphasis is being placed on the importance of presenting reports in more understandable terms, great strides are still being made in reducing the margin for misunderstanding to a minimum.

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* Supervisor of Mill Accounting, Fieldcrest Mills, Inc., Fieldale, Virginia.

Product Cost Reports for Milk Processors

by PERCY B. YEARGAN

MANY MILK PROCESSORS with adequate financial records do not use these records to determine unit costs of their products. The smaller ones have one accountant and one or two clerks who must spend their time in recording. There is a great temptation to adopt the attitude that the available manpower is insufficient to permit preparation of cost reports. However, the financial records, with few changes and little additional expense, may be used to determine unit cost. Preparation of the three cost reports presented in this article enables the accountant to furnish management the information useful in controlling many important phases of the operation, as well as in making comparisons with prior periods and evaluating employee performance.

Expansion of the chart of accounts may be required so that the maximum number of expenses may be originally recorded by cost centers. Those expenses that cannot be classified by cost centers must be allocated in some practicable manner as the cost reports are prepared.

Daily reports prepared in the various departments of the plant will provide the necessary detail for the preparation of unit cost reports. These daily reports are: (1) receiving reports, showing pounds and butterfat content of the raw milk received from each producer, (2) manufacturing reports, showing pounds and butterfat content of raw milk on hand at the start of the day, the amount of milk received during the day, the amount of materials withdrawn from stores, and the balance of milk on hand at the end of the day, (3) bottling summaries, showing the number of units processed, the pounds and butterfat accounted for, and (4) storage room reports, showing beginning balances by products, units of each product from processing during the day, units loaded out, and the ending balances.

Product Cost Worksheet[1]

A product cost worksheet should be prepared each month to show the cost of the material used in each unit pro-

[1] This report is adapted from the following sources: Milk Industry Foundation, *Accounting Manual for Milk Dealers;* J. M. Forbis, "You Lose with Poor Accounting" *Milk Plant Monthly,* August, 1954.

DR. PERCY B. YEARGAN, Birmingham Chapter, 1960, C.P.A., is Associate Professor of Accounting in the School of Commerce and Business Administration at the University of Alabama. Dr. Yeargan holds a B.A. degree from Howard College, and M.B.A. and Ph.D. degrees from the University of Alabama.

duced and the cost of the material that is unaccounted for. The amount unaccounted for may be caused by waste in the plant or by waste in the cold room. Manufacturing reports will indicate the pounds of shortage in the plant, and the storage room reports will indicate the number of units that are unaccounted for in the cold room.

The worksheet provides columns for beginning inventory, units sold and final inventory. The resulting difference shows the addition in units purchased, which is converted to gallons. At this point products are grouped by amount and type of raw products required and unit cost computed for the group. Such grouping saves time with little loss of effectiveness.

Gallons must then be converted into pounds and the pounds of butterfat accounted for, according to the percentages shown by butterfat tests for each product group. Butterfat and skim milk are next assigned a cost value based on the price paid for whole milk, 70 percent of the cost to butterfat and 30 percent to skim. The price paid for four-percent milk is $6.56 per hundred pounds. At this rate the cost of four pounds of butterfat is $4.59 or $1.15 per pound. The remaining 96 pounds of skim cost $1.97 or $2.05 per hundred weight. The value of surplus butterfat is determined in the same manner using the current price of $1.00 for Class II milk. The differentiation should be made during the surplus months in costing the buttermilk and the surplus sales if neither enters into the figure used in determining the base percentage amounts of the producers.

The cost of the butterfat is shown by product classes. In order to arrive at the amount of skim accounted for, the number of pounds of butterfat is subtracted from the total weight for each class of products. The cost of the skim is the product of the weight of the skim times the unit cost of the skim. The difference between the cost of milk used during the month and the total cost assigned to butterfat and skim is the cost of shrinkage. This cost may be allocated to products on a butterfat-contained basis if unit shrinkage cost by product is desired. Upon addition of purchased products other than milk. (chocolate, orange concentrate, sugar, etc.) the total cost of each product group is obtained.

Unit costs for product groups are computed by dividing total cost of each product group by number of gallons for each product group. The cost per gallon may be converted to unit cost for each product within the product groups by dividing cost per gallon by the number of units of the product in a gallon.

Distribution of Operating Expense to Cost Centers

Manufacturing processes of the company may be divided into three cost centers: the processing of the prod-

ucts that are manufactured, the bottling of the products in glass containers, and the bottling of the products in paper containers. There are also normally found three nonproductive or service cost centers: the selling and delivery activities, the administrative activities and the truck activities. Distribution of operating expenses may be implemented by use of a worksheet which spreads each expense item over columns designated for each of the several cost centers. The information for the worksheet can be taken directly from the general ledger if the expense accounts have been properly arranged.

Method of distributing the cost to the cost centers should be determined only after study and evaluation of the operations and need not be adjusted until there has been a major change in the method of operation.

Distribution of salary expense is illustrative of the methods that may be used to allocate other expense items to cost centers. Salary cost may be assigned to three cost centers: plant, delivery and administrative. Proper distribution of plant salaries to the processing, glass handling and paper handling cost centers requires determination of the amount of time spent by each of the plant employees on various duties in each department. Each month the person who prepares the worksheet can assign the proper percentage of plant salary cost to the cost centers by applying the predetermined percentage to the expense of the period. The selling and delivery costs are charged in total to the respective cost centers (selling, delivery and administrative). If the employees are assigned to one cost center only, the plant salary expense account may be subdivided, and this allocation will not be necessary.

Glass container expense is charged in total to the glass handling cost center. No allocation is necessary. Nor is allocation necessary for the paper container and supplies expense group. The total expense is charged to the paper handling cost center.

Distribution of the operating supplies account again requires study of the plant to determine the proper distribution of the fuel charge. Steam required or some other equitable basis may be used. Plant supplies should be distributed on a "where used" basis. Each cost center should be charged with the supplies actually used. Office supplies should be charged in total to the proper cost center as should route supplies, gas, oil and grease, and tires and tubes. The miscellaneous supplies account should be distributed on a "where used" basis.

Charges in the repairs account should be distributed on a "where used" basis at the time of the original entry of the expense charge. An exception is plant repairs which should be recorded in such a manner that the distribution can be made easily at a later time.

In the tax expense account, the two

accounts for payroll tax expense may be distributed according to the pay-roll charges. Taxes on the building may be distributed on a floor-space basis. The portion of the total space taken up by each cost center is a reasonable basis for distributing this charge. Taxes on the trucks should be charged directly to the truck expense cost center. Sales and use tax expense should be distributed to the cost center that incurs the charge. License charges can be handled in the same manner.

Insurance expenses incurred on the pay-roll may be distributed in the same manner as the pay-roll. Fire insurance on the building may be distributed on the floor-space basis, as were the taxes on the building. Truck expense is charged to the truck cost center. Public liability insurance cost should be charged to the centers covered by the insurance policy or the activity covered by the policy.

Depreciation expense is distributed according to the location of the depreciable asset. This distribution will follow the same pattern each period until there is a change in the depreciable assets.

Rental expense for items such as the filling machine is a direct charge to the department using the machines. The building rent may be distributed on the floor space used by each department or cost center.

Services purchased expense should be distributed on the "where used" basis. A study of the requirements of the plant equipment to determine the usage of the power, lights and water should be made. This again will be a one-time job.

Advertising expense may be charged directly to the delivery and selling expense cost center. General expenses may be charged on a "where used" basis for any unusual or material item. Otherwise, expenses of this nature may be charged directly to the administrative cost center.

Expenses are totaled by cost center columns after they have been distributed. The total cost of the cost centers concerned with the processing of the products of the company will be carried forward to the unit cost worksheet.

Unit Cost Worksheet

The total unit cost worksheet brings together the unit cost of the raw material and the expenses allocated to the operating cost centers, and combines them to arrive at the unit cost of producing the various products.

Total units accounted for and the total gallons in each unit are brought forward from the product cost worksheet. By use of conversion factors for processing each unit the processing unit cost is determined. Conversion factors should be determined by a study of the plant operation to evaluate and compare the cost of producing the various units. The cost of

processing a gallon of regular milk may be assigned a conversion factor of 1.0. The cost of processing a gallon of homogenized milk should be assigned a greater conversion factor because of the additional processing required. A conversion factor of 1.1 may be used. The cost of processing a gallon of chocolate drink is greater than that of regular or homogenized milk because the milk must be homogenized and then mixed with the chocolate powder and the sugar. The additional process might well result in the assignment of a factor of 1.3 to this product. The process of bottling whipping cream may require assignment of a conversion factor of 1.4, the bottling of buttermilk a factor of 1.25, and the processing of orange drink a factor of 1.15.

The number of gallons multiplied by the conversion factor gives the converted cost. The total processing cost is known. This cost is the total of the processing cost center costs from the worksheet giving distribution of operating expenses to cost centers. The total cost is then divided by the total converted cost to determine the cost of processing per factor. The cost per factor multiplied by the converted cost for each type of product on the worksheet gives the cost of processing for each item listed on the worksheet.

The factors of conversion for handling may be assigned to each product that is manufactured, by an appropriate study of the operation of the plant. The items to be considered in the determination of the glass handling factors would be the wages paid for the operation of the filling machines, the bottle trippage, the cost of the bottles, and the cost of the caps, hoods and other materials used in the bottling of the milk. The determination of the paper handling factors would include the wages paid for the operation of the paper filling machines, the cost of the paper cartons, the wax, staples and other materials used in the paper handling operation. The conversion factors are multiplied by the units accounted for, which are handled in glass containers to determine the glass converted cost units. Conversion factors are likewise multiplied by the units accounted for, which are handled in paper containers to arrive at the paper converted cost units.

The total of the glass converted cost units is divided into the total of costs allocated to the glass handling cost center. The quotient is the figure used to assign the cost of handling each class of product that is bottled in glass containers. The total of the paper converted cost units is divided into the total costs of the paper handling cost center. This quotient is the figure that is used in assigning the cost to each class of product which is bottled in paper containers.

To determine the total plant cost, the processing cost and the handling cost are added. The total plant cost divided by the total number of units

of each product gives the total unit plant cost. To the unit plant cost is added the material unit cost. By combining the two costs, the total unit cost of each product is determined.

Route Profit and Loss Statement

In addition to the reports which give costs by units and by cost centers, profit and loss statements for each route, both wholesale and retail, should be prepared. These statements can be used as the basis for making such decisions as revision of routes, addition of new routes, discontinuance of routes, and changes of route commissions.

Records must be devised to supply number of units sold by product and route. The unit costs from the unit cost worksheet make computation of cost of sales relatively easy. Sales commissions, truck expense and a pro-rata share of administrative expense are deducted from the gross margin to give route income for the period.

Summary

The additional clerical expense incurred to develop unit costs, costs by cost center and profit by routes will seldom be significant when weighed against the many benefits that knowledge of these facts brings. Management's decisions can be expected to lead to improved operations because this vital information has been made available.

Accounting for Radioactive Isotope Production

by JOHN T. REEVE

THE UNITED STATES, in the Atomic Energy Acts of 1946 and 1954, declared it to be the policy of this country that atomic energy shall be developed and utilized in improving the public welfare, increasing the standard of living, strengthening free competition and promoting world peace. In June 1946, an announcement was made of the availability of radioisotopes from Oak Ridge, Tennessee. Since then, the production and sale of radioisotopes has grown into a business, with annual sales over two million dollars.

The Oak Ridge National Laboratory, operated for the Atomic Energy Commission by Union Carbide Nuclear Company, is one of the principal producers of isotopes. Buyers of isotopes are hospitals, universities, consultants, research establishments and industrial concerns. While the isotopes business is a large-scale operation at Oak Ridge National Laboratory, it is by no means the major effort of the Laboratory. The production of isotopes at Oak Ridge National Laboratory is subdivided into production of stable isotopes and the production of radioisotopes.

Radioisotopes are mainly produced in nuclear reactors by several different processes: (1) by direct neutron bombardment, in which the target atom captures a neutron, and Cobalt-60 is produced (neutron capture), (2) breaking the heavy uranium atom down into lighter atomic weight elements (fission process), which are then separated and purified, and (3) changing the identity of the elements (transmutation process).

A nuclear reactor is a sort of atomic furnace. The first large nuclear reactor (commonly known as the X-10 Graphite Reactor) was used to produce radioisotopes, although this was not the principal use for which the reactor was designed. This reactor is still a major source of radioisotopes. In August 1946, the first shipment of radioactive carbon-14 was produced and utilized in cancer research. This was the beginning of the industry of production and sale of isotopes.

JOHN T. REEVE, Knoxville Chapter, 1952, C.P.A., is Auditing Superintendent of Union Carbide Nuclear Company, Oak Ridge, Tennessee, responsible for internal and contract audits. Previously, he was a Partner in the C.P.A. firm of Archie F. Reeve and Company, New York, N. Y. Mr. Reeve is Past President of the Knoxville Chapter.

Some Basic Scientific Facts

We may or may not have learned about isotopes. While, as we know, the atoms of a particular element basically are the same, and different from those of any other element, they may not be the same in terms of weight. Thus, isotopes are atoms of different weight but exhibiting the same chemical properties; in chemical reactions each isotype reacts the same as all other isotopes of the element. Thus we come immediately to the basic conclusion that no isotope of a particular element can be isolated by chemical reaction; it must be done physically.

Now, a radioisotope is simply, as its name indicates, an isotope which gives off radiation. Technically defined, therefore, it is a radioactive isotope, radioisotope being an abbreviation. Each radioisotope emits radiation, or "decays" at a characteristic rate. The "half-life" of the radioisotope indicates the time it takes for half a given quantity of an element to disintegrate into a new element. Radioactivity is measured in curies. A curie is that quantity of a radioisotope required to supply 3.70×10^{10} disintegrations per second (thirty-seven billion).

Radioactivity is the continuous emission of radiation in the form of alpha and beta particles and gamma rays, without any outside stimulation. It has been found that these rays, which are invisible and undetectable to the natural senses of a person, may penetrate the walls of the ordinary container, and may be harmful to the human body. (They may also be helpful if used properly.) These facts led to the necessity of enclosing radioactive substances in such a manner as to safeguard the health of the experimenters.

It could be said, therefore, that the initial production of radioisotopes was a by-product of nuclear reactor research. At the present time, there are many different types of experimental and power reactors. No matter what type a reactor is, it must be designed to keep people safe from radioactivity. At the present time, there are reactors in operation for the purpose of producing power, but because of the complex structure of a reactor and its high fuel and capital cost, the practicality of this use for a reactor is not yet firmly established.

The X-10 "pile," as it is popularly called, is a graphite reactor consisting of solid carbon blocks surrounded by thick, absorbing walls of concrete, which uses normal uranium as a fuel. Normal uranium, as found in ores in nature, consists of about .7 percent of the isotope U-235 and about 99.3 percent of the isotope U-238. It is the U-235 isotope which is fissionable; in fact, U-235 is the only naturally occurring fissionable material.

Industrial uses of radioisotopes may

be classified as follows: gauging and inspections, tracing action or flows of materials and for irradiation of materials. For example, thickness gauges using radioisotopes are so sensitive that steel can be rolled so thin that it takes 10 sheets to equal the thickness of one sheet of ordinary cellophane. These gauges work on the principle that the thicker the material, the less radiation can penetrate. In parts inspection, defects show up as radiation passes through the part because the defect or flaw will offer less resistance to radiation. Medical experts foresee continual extension of uses of radioisotopes in medicine. It is estimated that over a million people have been examined or treated with radioisotopes since the first medical use in 1946. There are many other uses, too extensive to discuss here. The above should give an indication of what may be expected.

The Accounting System for Isotopes

AEC has a policy which provides that, when isotopes are sold, the full cost of manufacturing and selling should be recovered in the price charged to the customers. This policy for radioisotopes is quoted as follows:

> "Radioisotopes produced in AEC facilities shall be priced at the higher of full cost recovery or reasonable, competitive, commercial prices so long as these prices are consistent with Section 81 of the Atomic Energy Act which requires that prices be established on such equitable basis as, in the opinion of the Commission, (a) will provide reasonable compensation to the Government for such material, (b) will not discourage the use of such material or the development of sources of supply of such material independent of the Commission, and (c) will encourage research and development."

Generally, the accounting system provides for inventory accounting including work-in-process and finished products. It provides for cost accounting, which is a combination of job-order and process-cost systems, by individual isotope. It includes many cost centers for collecting costs which are then allocated to products produced.

Production of Radioisotopes

When material is placed in a reactor to be subjected to irradiation for the purpose of making a radioisotope, it becomes "work-in-process" in accounting terminology. In normal manufacturing or production processes, various ways and means are customarily developed to measure quantities of product-in-process for purposes of costing and inventory evaluation. In the manufacture of radioisotopes, several intricate problems present themselves when one tries to measure work-in-process. First, materials being irradiated for Oak Ridge National

Laboratory may be located in several different reactors located in distant states, as well as in our reactors in Oak Ridge. This, of course, requires records of materials in the custody of others. The materials may remain in a reactor for years, depending upon the radioactivity required. Positioning in a reactor has a bearing upon the quality of the irradiation. For example, if material being irradiated in a reactor happens to be shielded, by some other materials, from neutron bombardments, the quality of the irradiation of our material would be adversely affected.

While material is in a reactor, it is not practicable, at a given time, to measure the strength imparted to the material through the irradiation process. It should be fairly obvious that the problems inherent in the handling of radioactive materials are of such a nature that the cost of assaying work-in-process would be prohibitive. This means, then, that our only data on the strength or curie value of the materials in process, until such time as they are actually removed from the reactor and assayed, are calculated engineering estimates with a probable accuracy of plus or minus 50 percent.

Cost Accounting for Radioisotopes

The costs of production of radioisotopes include the following:

Direct material costs, representing the cost of materials, including containers, that are irradiated in the production of the isotopes.

Reactor operating costs, including the operating costs of the reactor and all its auxiliary facilities, such as steam plants, pumping stations, electrical distribution systems, waste storage tanks, central service shops, etc., that are used in connection with the operation of the reactor.

Processing and other costs, including the costs of chemical separations and purification of products, special shielding and handling where required.

Allocated overhead costs, including the applicable portion of the overhead that is chargeable to fuel fabrication, reactor operations, processing, etc. In determining the proper share of reactor costs and net fuel costs to be allocated to specific products, such costs normally are distributed to the various reactor facilities or locations on a time-space-flux basis. In addition, a utilization factor may be applied to allow for the estimated unused time in the reactor facilities or locations while the reactor is operating, and also for the time when the reactor is not in operation.

Net fuel costs represent a proportionate share of the cost of fissionable materials used in fuel fabrication, transportation, fuel preparation, and fuel separations and recovery, less the value of the materials recovered.

Depreciation includes depreciation

expense on facilities used directly in the production and processing of isotopes, plus a proportionate share of depreciation expense for contributing services. Where facilities are used only in part for production and processing of isotopes, a proportionate share of depreciation expense for the jointly used facility is included.

A pro-forma operating statement for radioisotope production is prepared as follows:

ORNL, ISOTOPES DIVISION

PRO-FORMA OPERATING STATEMENT, RADIOISOTOPES

Year Ended _____

Revenue
- Sales

Cost of Sales
- Contracted reactor costs
- ORNL reactors and fuel costs
- Labor
- Material
- Sales, administration and accountability
- Plant overhead
- Depreciation
- Maintenance
- Health physics
- Utilities *
- Waste disposal
- Equipment decontamination

Total

Less:
- Costs transferred
- Net inventory adjustment

Add:
- Packing and shipping cost

Total cost of sales

Net Revenue

Other Expenses
- Sales subsidy
- Research and development

Net cost

Isotopes produced as a by-product of research are costed at the established average cost of production for such isotopes if already part of an in-

ventory account. If a new isotope is produced as a by-product of research, the cost will be estimated.

There are five major cost centers in radioisotopes production:

Fission products pilot plant (F3P)
Radioisotope separations department
Pile department (graphite reactor)
Research reactor
Low intensity training reactor

Individual cost (work-in-process) accounts are maintained for each inventoried radioisotope. Costs are charged direct as far as possible. Approximately twenty-five percent of the total production costs are charged direct. Costs which cannot be charged direct or associated with individual isotopes are collected in cost center accounts and later allocated to individual isotopes on some reasonable basis. Discussed below are some of the costs and their bases of distribution, which may be of interest.

Accountability Cost

This is the cost of a special "accountability" group whose function it is to keep track of "source and fissionable" materials. The Government and its contractors control uranium and other fissionable materials and account for them with great care and detail by grams by user. The cost of this accountability is apportioned to all laboratory projects and is not exclusively a cost associated with production of isotopes. A point system is in use to facilitate distributing of these costs. Points are assigned, generally:

1. To each division which has an "sf" materials balance.
2. To each transaction involving "sf" materials.

All points for the month are then totaled and accountability cost is distributed to divisions according to their points related to total points.

Isotope Division accountability costs are charged to reactor operating costs, packaging and shipping costs, radioisotope separation costs, etc., and distributed to isotope accounts along with other costs of these cost centers.

Administrative and Selling Cost

These costs are costs associated with production and sales of isotopes, since this is the only regular "commercial type" activity of the laboratory. The "sales" efforts of the laboratory are not similar to a sales department of a large industrial company. Neither the Government nor its operating contractors entertain or solicit customers. The effort is one of education and encouragement toward increasing the utilization of isotopes. Catalogs describing isotopes, their properties, quantities available, prices, purity ranges and much other data, are prepared, maintained and distributed by the isotope sales department. Much of

the contact with customers is by telephone and correspondence; the laboratory does not maintain a sales force in the general sense.

While cost accounting processes develop unit cost figures, they must be carefully and constantly analyzed in relation to current catalog selling prices and the latter periodically revised when major variances develop. Foremost in mind is the desire not to price any isotope out of the market.

Analytical as well as accounts receivable records on hundreds of customers are maintained. Records of stable isotopes on loan are kept. Much administrative work is entailed in scheduling deliveries, calculating quantity discounts, determining that licensing regulations are adhered to, accounting for returnable containers and deposits on them, invoicing for product and handling charges, and the multitude of other details inherent in any going business.

Costs of administration and sales are distributed on the basis of value of shipments made.

Operating and Allied Costs

Multicurie Fission Products Pilot Plant. In September 1958, the construction of a new two-million dollar plant for the large-scale, low-cost production of isotopes was started, and the plant is now in operation. This plant is designed to use the radioactive waste materials from other AEC atomic plants and reactors, separating the desired radioisotopes from the residue; thus the plant serves also the purpose of disposal of radioactive waste. The plant, known as the Multi-Curie Fission Products Pilot Plant (F3P) is equipped to separate, purify and fabricate isotopes in kilocurie quantities. A kilocurie is 1000 curies, in contrast to a millicurie, which is 1/1000 of a curie. Products of F3P are cerium-144, cesium-137, promethium-147, strontium-90 and technetium-99. This plant can produce 200,000 curies of cesium-137 a year, which is nearly double the United States' total annual curie consumption at the time the plant was built. The price of cesium-137 used to be $100 per curie; the present price is approximately $2 per curie.

Costs of operation of the F3P are collected and distributed to radioisotope production accounts based on labor hours expended.

Radioisotope Separations Department. Production costs which cannot be identified with a particular radioisotope are collected in this account and distributed on the basis of value of shipments made.

All target materials used are carefully selected or purified before irradiation in the nuclear reactor; spectrographic analyses and, in some cases, activation analyses, are made to determine the purity. The targets must then be placed in containers for insertion into the reactor. The next step is the placing of the materials in the reactor for irradiation,

after which they are removed and processed chemically by a wide variety of processes. After processing, it is necessary to test the products carefully for identity and for radiochemical and chemical purity. The preparations may be stored or shipped at once. Usually only those radioisotopes having half-lives of over thirty days are stored. Dispensing is done by remote control facilities. Then comes the packaging and shipping operation, which must also be done with "mechanical hands".

Reactor operating costs. The three principal reactors involved in the production of radioisotopes at ORNL are the (1) Graphite Reactor, (2) Low Intensity Reactor (LITR), and (3) Oak Ridge Reactor (ORR). These reactors are of "research" type. The research type reactor is one of low or moderate power, intended primarily as a strong source of neutrons and of gamma rays for research purposes. Materials may be subjected to the action of neutrons within the core or reflector, or a beam of neutrons covering a range of energies may be extracted through an opening (or beam hole) running into the reactor.

Costs of operating the reactors are accumulated in cost centers for each reactor. Records are kept on who uses the various assigned spaces in each reactor. Each space in a reactor has a value which is proportionate to its nearness to the reactor fuel or neutron source. Obviously, the closer the material to be bombarded (irradiated) is to the neutron source, the more intense will be the irradiation achieved. More cost, therefore, is assigned to the spaces nearer the fuel than to the outer spaces.

Each month, space usage reports are prepared and the total reactor operating costs are apportioned on this basis. Since reactors are used for research as well as for production of radioisotopes, not all the reactor operating cost is apportioned to radioisotope production.

Fuel costs. Fuel for the graphite reactor is normal uranium. The LITR and the ORR utilize enriched uranium as fuel. This, as indicated previously, contains more U-235 than normal uranium. Fuel costs are allocated to both research and to radioisotope production, generally on the basis of the reactor operating costs.

A peculiar observation relative to fuel costs is the fact that reactor fuel is also "raw material" for production of iodine-131, since it is produced by the "fission" process. This means, then, that a significant share of reactor fuel cost is charged directly to production cost of iodine-131, since iodine-131 is one of the largest sellers at the laboratory. It is interesting to note that to prepare 650,000 millicuries of iodine-131 to be sold, over three million millicuries were produced in 1960. This is the result of the short 8-day half-life of iodine-131 and the very slight incremental cost of producing the larger quantities. It was actually

deemed more economical to produce iodine-131 at less frequent intervals in larger quantities, letting most of the product decay, than to produce iodine-131 each week.

Depreciation. As might be expected, depreciation is a significant cost in manufacturing isotopes. While expensive to build, reactors at present have an estimated useful life of 25 years. Total depreciation allocated to isotope production cost approximates 10 percent of total production cost. Capital costs of the facilities used directly in the production of isotopes are segregated and depreciation is calculated in the conventional manner. Depreciation of facilities not directly used in production of isotopes is allocated to isotope production based on the ratio of isotope production costs to total ORNL operating costs. The total depreciation is then apportioned to each isotope on the basis of each isotope's total (fund) costs excluding depreciation.

Other costs. Costs quite important to radioisotope production are waste disposal, equipment decontamination and health physics. These costs are generated because of radioactivity of products produced. Waste cannot be flushed down the drain nor put into a scrap pile or dump because it could contain dangerous levels of radioactivity. Radioactivity may contaminate equipment used and equipment needs continual monitoring and periodic cleaning (decontamination). We speak of contamination in the sense of possessing too much radioactivity. Health physicists are employed to assure that contamination does not get out of control, and for other purposes.

These costs are distributed generally on the basis of labor dollars. Plant overhead is distributed to isotope production on the basis of direct labor dollars.

Radioisotope Inventories. Isotope inventories include radioisotopes with a half-life in excess of two years as listed below, and stable isotopes. At the present time, radioisotopes included in inventory are limited to

Element		*Isotope*	*Half-life*
Carbon	—	14	5,568 yrs.
Cesium	—	137	30 yrs.
Chlorine	—	36	308,000 yrs.
Cobalt	—	60	5 yrs.
Krypton	—	85	10 yrs.
Promethium	—	147	2.6 yrs.
Strontium	—	90	25 yrs.
Technetium	—	99	212,000 yrs.
Thallium	—	204	4 yrs.
Hydrogen (Tritium)	—	3	12.4 yrs.

Perpetual inventory records are maintained on these isotopes. Half-lives given are approximate.

The time required for half of a given quantity of an element to disintegrate into a new element is the half-life. Half-lives of radioisotopes range considerably. For example, iodine-131, extensively used in medicine, has a half-life of 8 days, while another large seller, cobalt-60, has a half-life of 5-plus years.

The impracticality of maintaining

an inventory of short-lived radioisotopes should be obvious. Therefore, short-lived radioisotopes are costed direct to cost of sales as manufactured. Inventories of nonradioactive isotopes (stable isotopes) are practicable and are measured by more or less conventional methods. The numbers after the name of the element identify the isotope. For example, there are stable isotopes carbon-12 and carbon-13 found naturally, in the abundance ratios of 98.9 percent and 1.1 percent, respectively. Since radioactive carbon-14 is not found naturally, it must be manmade and decays with a half-life of about five thousand years.

A major problem in a radioisotope inventory is the constant deterioration or decay of the inventory. A radioisotope is valuable in proportion to its ability to give off alpha, beta and gamma rays, and the common method of measuring is in curies. In other words, a given quantity of a radioisotope may have a lot greater radioactivity than the same quantity of another radioisotope. Since the radioisotope constantly radiates, it is constantly losing its "oomph" and therefore becomes less valuable as a source of radioactivity. The emanation of the rays is a factor of the passage of time, so that it can be seen the longer a radioisotope remains in inventory, the less valuable it becomes. Half of the original "oomph" is gone the first half-life, a quarter the second, an eighth the third, etc.

From the foregoing discussion, it can be concluded that conventional accounting techniques are not very useful for the measurement of radioisotopes inventory. A means of measuring the "oomph" of the radioisotopes inventory is what is needed. Such devices as the Geiger-Mueller counter are used to assay the strength of a radioactive substance. These devices count the number of disintegrations per second. Each radioisotope gives off rays and disintegrates at a characteristic rate, so that it is possible to predetermine, by mathematical formulas, the remaining "oomph" left in a radioisotope.

As discussed above, the emission of the various types of rays (alpha, beta, gamma) continues upon removing the irradiated material from the reactor. Nothing will stop this until the material has completely disintegrated or has reached the "stable" state. Thus, depending upon the rate of disintegration, we have lost some of the value of our finished radioisotopes as we are placing it in storage or in shipping containers. This presents a problem of inventory valuation which perhaps can best be illustrated by an example. Suppose we have an assay of 1,000 millicuries for a given batch which we calculate has cost $50,000 or $50 per millicurie (MC). Suppose the half-life is one year, and that during the year we have sold 500 MC, leaving book inventory of 500 MC. Now at the end of the year, we assay the re-

mains of the batch, finding 250 MC, instead of 500 MC. The problem which presents itself is how to determine a value for "decay," how to apportion it to cost of sales and to remaining inventory and whether, in the above example, dollars associated with decay should be added to remaining millicurie values in inventory, or charged off. Using this example, here is how cost of sales could vary: A is where decay is charged off as it happens; B is where decay is apportioned to inventory and cost of sales.

	A		*B*	
	MC	*$*	*MC*	*$*
1st Year				
Sales	500		500	
Cost of sales	500	25,000	500	35,714
Decay cost	250	12,500		—
Total		37,500		35,714
2nd Year				
Sales	200		200	
Cost of sales	200	10,000	200	14,286
Decay cost	50	2,500		—
Total		12,500		14,286
Inventories available for sale would be valued as follows:				
End of first year	250	12,500	250	14,286

As can be seen, Method A writes off decayed units as they decay, while Method B defers part of the write-off to the second year. Method A produces a more conservative ending inventory value, while Method B shows the ending inventory more nearly at the value which must still be recovered through sales under AEC's full-cost recovery policy. Method B more nearly approaches the theory of matching costs and revenue, while Method A is closer to the doctrine of conservatism in accounting.

As a practical matter, at the present time, decay costs on all inventoried radioistopes, except thallium-204, are written off to cost of sales as the decay happens. This is done on a monthly basis by using a "decay factor" applied to ending book inventories. Decay on thallium-204 is, in effect, prorated over the quantities expected to be sold this year and in future years.

Where practical, a physical inventory is taken annually and is based on current measurements. The practicability of physically inventorying radioisotopes is affected by such factors as radioactivity, the physical form of the material, the quantity, value, difficul-

ties of measurement, cost of measurement, exposure of personnel to radiation, and the extent of analytical data on like material. Measurements are derived by analyses of representative batch samples applied to current net weight or volume of material. Analysis is by radiation assay instruments. Where impractical to physically inventory material, the inventory is based on one or more of the following methods:

1. Previous analysis applied to current net weight or volume, corrected for decay.
2. Verification by piece count or container count with the curie or millicurie quantity based on batch record cards, less shipments, decay and known losses.
3. For gases stored under pressure, computation of quantity on the basis of current pressure-volume measurement and previous assay, less decay.
4. Visual inspection of batches with curie or millicurie quantity based on batch record card, less shipments, decay and known losses.

Liquids or solids as measured are translated by means of formulas from liters and grams to curies or millicuries, corrected for decay. Where it is impractical to view receptacles in reserve storage in underground concrete pits, the quantities and dates of production of batches are used to figure decay losses for the period since last inventorying.

Production of Stable Isotopes

Stable isotopes are isotopes of an element which do not give off radiation, or at least the radiation is so negligible that it can hardly be detected. Radioisotopes, as discussed previously, give off radiation changing from element to element, gradually reaching the stable condition, at which point they may have become an entirely different chemical element from the initial radioisotope. One method of producing stable isotopes not found in a natural state is in the calutron. The difference in the atomic weights of the different isotopes of an element makes possible their separation by physical means. The calutron is an electrical device which utilizes the different atomic weights to separate the isotopes. The element in gaseous form streams through the magnetic field of the calutron following the arc of the field. The lighter isotopes are more influenced by the magnetic field than are the heavier ones, so that the various isotopes are collected in calutron "pockets" according to their atomic weight. At ORNL, practically all of the known stable isotopes have been separated and are used extensively in research and in medicine.

While we do not have the process of decay affecting our stable isotopes inventories, we have other problems. The AEC has a policy in order to encourage research, under which scientific institutions may borrow isotopes.

This creates the necessity of having these loans recorded since the stable isotopes are government property and must be accounted for.

Stable isotopes are also sold under the policy of full-cost recovery. Accounting problems peculiar to stable isotopes include the apportionment of the cost of operating the calutron. It can be seen from the description of the operation of the calutron that, if we wish to produce one particular stable isotope, a number of other isotopes may be produced concurrently. Thus we have the old by-product accounting problem and a question of how much cost to assign to the by-product. We also have the question of whether to keep the by-products or throw them away and, if we keep them, whether or not we should maintain quantity records. This problem is presently handled by apportioning all production costs to wanted isotopes.

Stable Isotope Cost Accounting

The cost of calutron operations and chemistry costs are accumulated in separate accounts. These costs are distributed monthly to the in-process inventory element accounts on which work was performed. The calutron cost is apportioned based on the number of calutron hours of operation expended for each element, related to total monthly calutron hours.

Chemistry cost includes the cost of the process of chemical refinement, including bleaching, neutralizing, dissolving, diluting, filtering, washing, drying, etc. All this is necessary to produce a product of maximum purity. This cost is distributed on the basis of number of man-hours spent on each element, related to total monthly chemistry man-hours.

The in-process cost accumulated is added to prior inventory balances by element. On completion of associated production work, yields of completed isotopes are determined. Average production costs are used in transferring from in-process to completed inventory, and from completed inventory to cost of sales.

Stable isotopes are sold at prices based on "enrichment" or purity ranges. In separating stable isotopes in the calutron, it is manifestly impossible to produce a 100-percent pure product. By rerunning a product through a calutron, it is possible to increase the purity of a desired isotope and the purity is in proportion to the frequency of runs in the calutron. It is logical, therefore, that the sales price of a high purity isotope is greater than that of a low purity isotope. Not withstanding this difference in sales prices, isotopes are not costed by purity ranges, simply because the cost of the accounting work involved would be prohibitive.

Stable isotopes are measured in terms of grams and milligrams, in contrast to the curie and millicurie for radioisotopes. It has been necessary, through the use of scientific methods,

to determine maximum inventory levels for stable isotopes so that we will not be allocating costs to stable isotopes produced as by-products which will never be sold. We must do this in order to recover as much of the full cost of producing isotopes as possible.

There are no particularly unique physical inventory problems for stable isotopes since decay is not a factor. There are, however, minor problems of measurement in that minute quantities of products may be produced in relation to conventional production. For example, when an isotope is loaned to a university and returned, we must qualitatively analyze the material to be sure that it is pure before putting it back into inventory. Qualitative analysis uses up some of the inventory and, in dealing with small quantities, this can have a relatively large effect on the amount of material placed back in inventory. Another minor problem is the segregation of the inventory available for sale and the inventory available for loan, and the inventory for research.

In connection with cost accounting for stable isotopes, there is a rather large number of accounts. In fact, there is a separate account for each stable isotope produced and there are over 300 isotopes. Fortunately, about 80 to 90 percent of the accounts are inactive at any one time. The activity of the accounts is dependent upon the customers' orders and our inventory needs.

Stable isotopes are used for target materials for preparing radioistopes, for research and study, for bone cancer studies, optical studies, etc.

Stable Isotope Inventory

Perpetual inventory records are maintained on all stable isotopes. In addition, records are maintained on the production, sales and loans of all isotopes. Stable isotope inventories are classed as follows:

Active
Active—on loan
Nuclear Cross Section Advisory Group Pool
Nuclear Cross Section Advisory Group Pool—on loan

The Nuclear Cross Section Adivsory Group was formed to decide which stable isotopes should be kept in inventory for scientific research. This material is reserved for research personnel involved in the various nuclear cross-section measurements.

Additions to the completed inventory are made after complete analysis. No value is assigned to unwanted isotopes, which may result as by-products or excess production due to the peculiar production methods which are required. However, such isotopes are physically retained for possible return to inventory, if required.

Physical inventory is made by physical observation of all batches, sight checking of bottles or containers, and by periodic weighings. The unit of measurement is grams or milligrams; for liquids it is liters or cubic centi-

meters. Viewing the levels in standard-sized containers is the method generally used in the physical inventory. The approximately $5 million stable isotope inventory (about 237 isotopes) is contained in a single file cabinet, under lock and key.

Material Handling of Radioisotopes

As was discussed above, the emission of rays from radioactive substances makes it necessary to devise methods of handling radioisotopes for maximum protection to the people doing it. This necessitates the installation of expensive remote-control handling devices and means of observing through thick protective glass. The use of these devices has been developed at ORNL. In addition to the special equipment for handling radioactive materials, suitable shipping containers had to be developed so that the harmful rays would not escape from the container. Initially, these containers were quite large and, being lined with lead which absorbed the rays, were very heavy. Disposable containers have been devised and are now used in about 90 percent of the radioisotopes shipments. There is still a need for lead containers for the shipment of large gamma emitters. While the use of a disposable container saves the customer up to 70 percent of the transportation costs, there are occasionally some shipments where the cost of the container and transportation charges exceed the value of the product being shipped. The disposable containers are usually made of fiberboard boxes with several layers of additional fiber board, absorbent wadding, and a tin can.

To protect the people handling radioisotopes, it is necessary to maintain constant surveillance over the amount of radioactivity being absorbed by means of metering devices attached to the person. AEC has set limits of exposure to radiation beyond which there may be danger. The meters indicate the extent of the radioactivity to which the wearer has been subjected.

Radioisotopes with very short half-lives (less than one week) need to be handled expeditiously and are usually shipped by air. Postal regulations prescribe that only very small amounts of radioactive material can be sent by mail. While many industries have returnable container problems, they are amplified in the radioisotopes industry because of the variations in the types of returnable containers, the expensiveness, and the necessarily odd sizes, shapes and weight in relation to product shipped.

Special Pricing

Although it is the policy of the United States to stimulate the use of radioisotopes, thus increasing the standard of living, it is not always pos-

sible to achieve this and at the same time recover the full cost of producing a radioisotope. It has been found necessary in some instances to reduce the sales price of certain radioisotopes somewhat below the full-cost-recovery price to further stimulate uses of radioisotopes, thus "subsidizing" the operation to a degree.

In line with the policy of promoting the sale and use of radioisotopes, Congress has provided for the allowance of discounts for purchases of radioisotopes for use in research and the fields of agriculture and biomedicine at 20 percent of the current price. Under these discount procedures, a customer may purchase a substantial quantity of a radioisotope but take delivery as ordered in the future. Under this arrangement, ORNL becomes the holder of our customers' inventory. This arrangement is advantageous to the customer because not only can he get a quantity discount, but his problems of storing the radioactive material are minimized. As can be expected, this arrangement, while benefiting the customer, creates additional problems for the supplier.

Services Offered

Besides manufacturing and selling isotopes, Oak Ridge National Laboratory renders services. For example, service irradiations on customers' materials such as gears, piston rings, seeds, chemical compounds, etc., may be performed. The laboratory can also handle radioactive waste disposal for customers. Another service is neutron-activation analysis. This service consists of irradiating customers' samples in a reactor and identifying radioisotopes produced by means of their specific radiation characteristics. The laboratory is also prepared to produce a number of different types of fabricated radioactive sources, on a job order basis.

On the basis of large-scale production of the new F3P, AEC has made major price reductions in some radioisotopes. This, of course, creates new accounting problems for both ORNL and secondary suppliers relative to inventories of radioisotopes bought or manufactured prior to the F3P operation at substantially greater cost.

AEC is initiating programs to accelerate development of the technology of use of separated fission products in industry, agriculture and medicine. Educational programs are promulgated by AEC through extensive classroom instruction carried on at the college graduate level at Oak Ridge Institute of Nuclear Studies and elsewhere. Here one may take an extensive course on the techniques and uses of isotopes in research, medicine and industry. The increasing use of isotopes has stimulated the formation of private companies to handle and distribute isotopes and to advise and conduct research with isotopes. This is what the AEC wants and is in line with the

Atomic Energy Act of 1954 referred to at the beginning of this paper.

Since the procurement and use of radioisotopes is governed by Federal regulations, the prospective user must first obtain a license from AEC. A purchaser must, therefore, submit evidence of a valid license before he will be able to purchase radioisotopes. The reason for this should be obvious; radioisotopes falling into the wrong hands could be extremely dangerous. It follows that the purchaser must be qualified to handle these materials in such a manner as to prevent any danger to himself or to others.

Program for Converting to "Whole-Dollar Accounting"

by JAMES B. FROST*

"WHOLE-DOLLAR," "penny-elimination" or "centless" accounting is often well described but sometimes in over-general terms. Something closer to the entries themselves is needed. In this direction, recommended bases for a program of whole-dollar accounting are offered as follows:

Do not attempt to eliminate cents where third parties are involved. This means that cents are retained on invoices to customers, accounts payable, checks to vendors, paychecks to employees and dividend checks to stockholders. Do not eliminate cents in cash accounts, accounts receivable, accounts payable, accrued pay roll and accrued pay-roll deductions.

Always use only whole dollars in posting to the following accounts in both general and subsidiary ledgers:

Inventory
Property, plant and equipment
Depreciation reserves
Prepaid expenses

All income and expense accounts: sales, freight, returns and allowances, cost of sales, manufacturing expense, general and administrative expense, selling expense, research and development expense, other income and expense (except for one "cents elimination" account).

* Assistant Treasurer and Budget Director, Diebold Incorporated, Akron, Ohio.

In preparing journal vouchers, write in whole dollars *all entries* to these accounts, with an offsetting charge or credit to the cents elimination account.

Process accounts payable distribution as follows:

1. Distribute the accounts payable invoices during the months to include the pennies. This is advisable to facilitate balancing and save time and errors in rounding many documents manually.
2. At the month-end, prove that the distribution detail total is in balance with the total accounts payable control. Then round out to the nearest dollar the total amount for each account. On punched card equipment, this step can be accomplished automatically by locking 50¢ into the tabulator as an add-on to each item. The tabulator should then be wired to print dollars only, dropping cents.
3. On the journal voucher prepared for the accounts payable distribution, show a debit or credit to the cents elimination account for the cents difference between the exact accounts payable total and the rounded distribution total.

Process pay-roll distribution as follows in a mechanized system of computing pay-roll distribution:

1. Carry exact cents on the individual labor tickets.
2. Weekly or at the month-end prove that the distribution detail total is in balance with the total gross pay-roll control. Then round out to the nearest dollar the total amount for each indirect labor account and each factory order for direct labor. This can be done on the tabulator as described above.
3. On the pay-roll distribution journal voucher, show a debit or credit entry to the cents elimination account for the exact difference between the exact pay-roll total and the rounded distribution total. If the pay-roll is computed manually, substantial savings can be realized by writing whole dollars only on each labor ticket by rounding to the nearest dollar. This saves writing and adding two digits out of four on thousands of tickets.

Sales distribution should be processed as follows in a mechanized program:

1. Carry the exact cents on the individual accounts shown on the invoices.
2. Weekly or at month-end prove that the distribution detail total is in balance with the total accounts receivable. Then round out to the nearest dollar the total amount for each distribution account.
3. On the sales distribution journal show a debit or credit entry to the cents elimination account for exact difference between the exact accounts receivable total and the rounded distribution total.

Cost of sales distribution should be written in whole dollars on the invoices, if processed manually. If a mechanized program is used, cents can be eliminated immediately, provided the unit cost is large enough so that the rounded figure does not cause significant distortion. Otherwise, the exact cost can be used for the individual invoices, and the rounding to whole dollars can be handled at the month-end.

Material transactions can be handled as described above for cost of sales, that is, round the individual documents, if the time saved in writing, adding, key punching and verifying offsets the time needed for the rounding and proving to control totals.

In conclusion, it should be possible to convert to whole-dollar accounting in one month's time with a minimum of difficulty.

An Experiment in Costing University Instruction

by GEORGE D. GAMBLE

A STUDY of the instructional costs of a masters degree in nursing, conducted in the fall of 1959, demonstrated that the techniques of process cost accounting can readily be applied to an analysis of university costs.

University Operations and Accounting

A review of the characteristics of a university will illustrate similarities with the manufacture of a product:

1. The "products" of a university are the various degrees which are offered by the institution.
2. Each degree has "component parts"—the credit hours of instruction which are required for the degree.
3. Credit hours are "manufactured" in departments which incur direct costs—principally the salaries of instructors—and indirect costs of general administration, libraries, student personnel services and plant overhead.

Instructional cost computations are simplified by the absence of a raw material component in the costs. Furthermore, since the product is sold as produced, there is no inventory at the end of each fiscal period.

Instructional cost computations are complicated by several characteristics of university operations and accounting procedures:

1. Fund accounting methods may tend to disperse the instructional costs in the accounts, according to the source of the funds which have been expended. Current funds, plant funds and restricted funds all contribute to the support of instructional activities.
2. The costs of buildings and equipment are not depreciated in the accounts by charges to income.
3. Universities usually engage in non - instructional activities, such as organized research auxiliary enterprises (residence halls, book-stores, etc.). The costs of such activities, including an allocation of general administrative and overhead costs, must be excluded from instructional cost computations.
4. Departmental personnel are

GEORGE D. GAMBLE, C.P.A., is Controller of The Morey-LaRue Laundry Company, Elizabeth, New Jersey. Prior to association with that company, Mr. Gamble was a member of the staff of Peat, Marwick, Mitchell & Co., Newark, New Jersey.

EXHIBIT 1

Worksheet for the Determination of the
Cost of a Masters Degree in Nursing

	Totals	INSTRUCTIONAL DEPARTMENTS			
		Graduate Nursing	Education	Arts & Sciences	All Other
Direct Salaries:					
Current funds	$ 2,950,000	195,000	500,000	980,000	1,275,000
Restricted funds	50,000	5,000	-	20,000	25,000
	3,000,000	200,000	500,000	1,000,000	1,300,000
Other Direct Costs:					
Current funds	200,000	21,000	11,000	44,000	124,000
Restricted funds	25,000	-	-	10,000	15,000
Less expenditures for equipment	(50,000)	(10,000)	-	(15,000)	(25,000)
	175,000	11,000	11,000	39,000	114,000
Indirect Costs:					
Administration and general	900,000				
Plant maintenance	800,000				
Student personnel services	500,000				
Library	300,000				
Less expenditures for books	(200,000)				
Add depreciation of books	150,000				
Depreciation of plant and equipment	200,000				
Less overhead allocated to research	(150,000)				
Allocation to departments	2,500,000	167,000	417,000	833,000	1,083,000
Total Departmental Costs	$ 5,675,000	378,000	928,000	1,872,000	2,497,000
Total Student Credit Hrs. Taught		5,400	23,200	31,200	
Cost per Credit Hour		$ 70	40	60	
Credit Hour Components - Masters Degree in Nursing		28	8	4	
Instructional Cost - Masters Degree in Nursing	$ 2,520	1,960	320	240	

sometimes engaged in both instructional and non-instructional activities. Salary costs in such cases must be allocated in proportion to the benefit realized by each area of service.

5. Individual departments frequently provide both baccalaureate and graduate levels of instruction. A segregation of the direct costs of each level of instruction is rarely made in the accounts, although a significant differential exists. This should be recognized in any cost analysis.

The complications which are encountered in the determination of instructional costs are not insurmountable, however. Similar problems are encountered in industrial cost accounting. They can be solved by modifications in the account classifications and by common allocating techniques.

Particulars of the Study

A review of the methods used in the cost study which has been mentioned illustrates a practical application of process costing methods to the analysis of instructional costs. The instructional cost of a typical masters degree in nursing was determined for each of five selected universities. Because of limitations of the survey, a costing procedure was devised which would utilize financial data and statistics that are generally available in the records of universities. The simplicity of the computations is illustrated by the fact that the work was performed at each participating institution by one accountant in three days.

The first step in each analysis was the determination of a typical masters degree program in nursing. With the assistance of the director of the department of nursing, the component credit hours for each instructional department represented in the program were obtained. The instructional cost per credit hour, for each department, was then determined on a worksheet in the form which is illustrated in Exhibit 1. The form has been simplified for purposes of illustration and, therefore, does not show some adaptations and allocations which were applied as required in each analysis. The usual source of each of the various data is described in the following paragraphs.

The annual financial reports of the universities usually provided the following items:

Direct salaries by department, paid from current funds.

Other direct costs by department, paid from current funds.

Total costs of:

Administration
Plant maintenance
Student personnel services
Library.

Direct salaries and other direct instructional costs paid from restricted funds were obtained by analysis of the expenditures from the restricted funds,

usually presented in the financial reports. (Current operating expenses financed by restricted funds should be reported in the current funds operating statement if the principles of fund accounting are properly applied but, in this respect, one will find that financial statement presentation varies.) Expenditures for books and equipment were obtained by analysis of the library and other cost captions.

Depreciation of books was determined by multiplying the number of library volumes by an estimated "use value" per volume. Depreciation of plant and equipment was determined by first accumulating either the costs or the insured values of buildings and equipment which were used for instructional purposes. Estimated composite rates of depreciation were then applied to the total values of buildings and equipment.

The overhead allocation from instruction to organized research was determined by utilizing rates which had previously been computed by the auditors of government-sponsored research projects at each institution. Such rates are based on the direct salaries charged to research projects.

The allocation of total indirect costs to each department was made in proportion to direct salaries. This was the only reasonable base which was readily obtainable from the records of the institutions.

Totals of student credit hours taught by each department were obtained by the detailed analysis of registration statistics. Unfortunately, credit hour statistics are usually summarized according to the departments in which the students are registered, rather than by departments in which the courses are taught.

Closely Accurate Results

Although the procedures which were used in the study were not expected to produce exact costs for each university, tests have indicated that the results were accurate within ten percent of actual costs. The composite results of the five analyses adequately satisfied the purposes of the study.

The study has demonstrated that unit instructional costs can be determined from university records which are generally available. Modifications in accounting classifications would simplify the computations. Greater accuracy in the allocation of indirect costs could be obtained by the use of a specific representative base for the allocation of each type of cost.

Unit instructional costs provide a common basis for the comparison of costs of the departments of a university. They also provide a means of evaluating the adequacy of the tuition fees which are charged by the institution. Since unit instructional costs are not difficult to determine, they should be more fully utilized in the financial management of universities.

Cash Balance Control for Short-Term Forecasting

by R. L. FULLER and H. H. SEIFFERT

THIS ARTICLE describes an approach to cash forecasting from "scratch" in a medium sized corporation.

The need for cash *per se* has never been a pressing problem at ABC Company; we have always been able to satisfy our needs for expansion or growth without resorting to outside borrowing. This is not to say that we should remain complacent because of this and not consider seriously cash forecasting in anticipation of future requirements, but rather to make it clear that our immediate need for sound cash forecasting is only in the "pay-off" area of increasing our short-term investment base. We always keep in mind that outside short-term investment of excess cash is only second best to ascertaining ways of utilizing such cash in our organization.

The essence of the problem is to determine and maintain a minimum bank balance that will be sufficient to meet all our obligations as they become due, without having to experience either (1) notice from the bank that our account is unprofitable or (2) wide fluctuations in our short-term investment base.

It is evident that the bank balance cannot be a fixed amount, but with the tools available we should be able to plan a reasonably accurate daily balance so that consideration may be given to entering into more repurchase agreements and/or other avenues that will generate a return on available excess cash even when such availability is of a short duration. The tools by which to achieve this goal are as follows:

1. Anticipation of receipts through centralized accounts receivable.
2. Control of receipts through lock box operation.
3. Concept of bank float — receipts and disbursements.
4. Anticipation of significant and recurring disbursements.
5. Concept of mail float — disbursements.

Anticipation of Receipts Through Centralized Accounts Receivable

Accounts receivable are centralized at home office with daily billing information for the four billing locations. Home office information is received approximately one work day following the day billed; billing in-

R. L. FULLER, Raritan Valley Chapter, 1957, C.P.A., is Assistant Controller, Johnson & Johnson, New Brunswick, New Jersey. Formerly, he was associated with Price Waterhouse and Company, Philadelphia, Pennsylvania. Mr. Fuller is a graduate of Rider College, Trenton, New Jersey. He is a previous contributor to the *Bulletin*.

H. H. SEIFFERT, Raritan Valley Chapter, 1960, is a Staff Analyst with Johnson & Johnson, New Brunswick, New Jersey. Previously, he was associated with the American Cyanamid Company, New York, N. Y. Mr. Seiffert received his B.S. and M.B.A. degrees from New York University.

formation for the other locations is usually four days to one week behind the actual billing date. This information serves to update the receivables hold files.

Our printed invoice terms are 5/10, n/30 with the exception of one class of trade to which our terms are 5/10, no net. However, with a large majority of our customers, these terms have come to be interpreted as 5/10 e.o.m, i.e., a customer billed on 10/-1/60 may pay by November 10 (post office cancellation) to receive a 5 percent discount. And, in most instances, customers billed on the 25th of the month or after, receive 5/10 e.o.m. of the following month or as much as a 45-day discount period. This brief explanation of the treatment of terms is by no means all inclusive nor does it touch upon any of the possible ramifications such as a substantial amount of sales occurring in a certain period of the month with resultant burdens on billing and shipping, but rather is inserted here only to point up some of the considerations that must be taken into account in attempting to formulate a pattern or relationship between sales and anticipated receipts. It is necessary, in order to arrive at a sound relationship between billings and receipts, to take into consideration the various purchasing frequencies of customers and evaluate the effect of the various discount terms, seasons, bad debts, charge backs, credits, etc.

Control of Receipts Through Lock Box Operation

We currently have four banks rendering lock box services:

Bank 1—East (Concentration Bank)
Bank 2—West
Bank 3—South
Bank 4—North

The lock box services accomplish two useful purposes:

1. Speed up cash availability because the customer remits directly to a bank.
2. Alleviate a work burden in the accounts receivable section that would occur during the middle of the month when customer remittances are heavier, due to the nature of our discount terms.

By a detailed analysis of receipts as they flow through the home office cashier in the form of photostatic remittances, in conjunction with the first tool outlined previously along with the concept of bank float summarized later — it should be possible to plan receipts by lock box location.

Consideration might be given towards expanding lock box operations in the future. Our current lock box services are rendered by banks that have a proximity of location with our distribution and billing centers, with the exception of the southern warehouse (all billings are out of the home office with customers requested to remit to Bank 1—East.) The decision to ship to customer from one of four distribution centers, as opposed to shipping out of another, is based on a predetermined calculation of the most economical freight rates to be realized on such shipments. It does not follow, however, that remittance by the customer to a lock box in the location that shipped to him is the fastest way of getting the remittance. At a current level of receipts four lock

boxes may be sufficient but, as we grow, it may be more advantageous to establish additional lock boxes closer to the geographical location of the customer. The invoices out of the distribution centers would have the various lock box designations in the total area serviced by the particular distribution center rather than listing, as they now do, the four current lock boxes in use on a national basis.

Concept of Bank Float—Receipts and Disbursements

Receipt bank float may be defined as the lapse of time between the recording of customers' remittances to our bank balance and the time the cash becomes available for our disbursement. Exhibit 1 illustrates arithmetically the fact that, although our bank balance shows one amount, this is not the amount available for our disbursement, because of the float involved. By determining float by lock box bank, a speed up of cash might be accomplished by reducing the "hold" time, thereby affecting cash transfers more swiftly.

In the hypothetical example, we start the month with a true (available cash) bank balance of $1,000. Customers' remittances during the month are immediately reflected by crediting our account, and so increasing our bank balance. Although the bank has credited our account, the check must be cleared through the Federal Reserve District in which the customer maintains his funds. In the case of Bank 1—East lock box operation, any remittances from customers' maintaining funds in a New York state or Northern New Jersey bank would generally have a one-day float (not the recorded day of receipt to our bank balance but the day after) because the bank clears the customers' checks through the Second Federal Reserve District of which both banks (Bank 1—East and the customers' bank) are members. (Federal Reserve Bank credits the lock box bank and charges the customers' bank for the amount of the remittance). If, on the other hand, a customer has remitted a check drawn on a bank outside of the lock box bank's Federal Reserve District, there is generally a three-day float. The lock box bank submits customers' remittances to its Federal Reserve Bank. The Federal Reserve Bank then forwards the customers' remittances to their respective Federal Reserve Districts for credit.

For the purpose of determining float by lock box bank, every check coming from customers would have to be examined on a daily basis for a period long enough to establish a pattern. Every bank has a symbol on its checks for the numerical identification of its location, indicating the state or principal city of the bank, the bank, the Federal Reserve District that the bank is located in, the Federal Reserve Bank Branch of which the bank is a member and whether the item is received for immediate or deferred credit. Such examination should be undertaken for a period sufficient to get a reasonable pattern of time required.

Disbursement float is practically the reverse of the above situation. We have reduced our balance at the time we draw our checks and mail them. When the payees deposit our checks with their banks we have already reduced our balance, whereas there is

EXHIBIT 1

Float Calculation on Receipts at Any Lock Box Operation

	(1) Receipts (Columns 3 and 4)	(2) Bank balance	(3) 1-Day checks	(4) Three-day checks 1st day	(5) Three-day checks 2nd day	(6) Three-day checks 3rd day	(7) True bank (1-3, 4, 5, 6) balance	Alternate Method: Receipts	Alternate Method: Bank balance	1-Day checks	3-Day checks (X3)
1st day Wednesday	$	1,000					1,000		1,000		
2nd day Thursday	2,000	3,000	700	1,300			1,000	2,000	3,000	700	3,900
3rd day Friday	1,500	4,500	1,400	100	1,300		1,700	1,500	4,500	1,400	300
6th day Monday	2,200	6,700	500	1,700	100	1,300	3,100	2,200	6,700	500	5,100
7th day Tuesday	3,900	10,600	1,600	2,300	1,700	100	4,900	3,900	10,600	1,600	6,900
8th day Wednesday	1,000	11,600	400	600	2,300	1,700	6,600	1,000	11,600	400	1,800
9th day Thursday	3,900	15,500	1,700	2,200	600	2,300	8,700	3,900	15,500	1,700	6,600
10th day Friday	2,300	17,800	1,800	500	2,200	600	12,700	2,300	17,800	1,800	1,500
13th day Monday	3,300	21,100	1,600	1,700	500	2,200	15,100	3,300	21,100	1,600	5,100
14th day Tuesday	3,400	24,500	1,100	2,300	1,700	500	18,900	3,400	24,500	1,100	6,900
15th day Wednesday	6,500	31,000	4,000	2,500	2,300	1,700	20,000	6,500	31,000	4,000	7,500
16th day Thursday	5,000	36,000	1,300	3,700	2,500	2,300	26,200	5,000	36,000	1,300	11,100
17th day Friday	2,100	38,100	1,600	500	3,700	2,500	29,800	2,100	38,100	1,600	1,500
20th day Monday	2,900	41,000	1,300	1,600	500	3,700	33,900	2,900	41,000	1,300	4,800
21st day Tuesday	2,200	43,200	1,700	500	1,600	500	36,900	2,200	43,200	1,700	1,500
22nd day Wednesday	200	43,400	200		500	1,600	41,100	200	43,400	200	
23rd day Thursday	2,200	45,600	900	1,300		500	42,900	2,200	45,600	900	3,900
24th day Friday	3,400	49,000	1,600	1,800	1,300		44,300	3,400	49,000	1,600	5,400
27th day Monday	5,700	54,700	2,000	3,700	1,800	1,300	45,900	5,700	54,700	2,000	11,100
28th day Tuesday	6,400	61,100	4,300	2,100	3,700	1,800	49,200	6,400	61,100	4,300	6,300
29th day Wednesday	3,800	64,900	2,200	1,600	2,100	3,700	55,300	3,800	64,900	2,200	4,800
30th day Thursday	1,600	66,500	700	900	1,600	2,100	61,200	1,600	66,500	700	2,700
Total		690,800					562,900		690,800	32,600	98,700
Average Balance		31,400					25,586				
Average Float (2-7)				$5,814*					5,968*		

* Dollar difference of the average float between the two methods is due to alternate method subtracting three days at once.

generally anywhere from a one to three-day float before our true cash balance will be reduced by the East Bank. This is necessary in order to calculate a bank return on our balance. This statement can be substantiated by an examination that would compare check dates with the dates shown on the Bank's tabulated run of cleared checks furnished us monthly.

Anticipation of Significant and Recurring Disbursements

In contrast to long-range forecasting of cash requirements on a quarterly or annual basis, we are thinking in terms of generating, through detail planning, excess cash for short-term investment. In view of this, it becomes of utmost importance to plan all cash outflow on almost a day-to-day basis. As a starting point, there should be a detailed schedule of total anticipated payments on an annual basis, continually revised and updated in new forecasts whether these are monthly, quarterly or semi-annually. On the basis of the detailed schedule, there will be certain payables of significant amounts that can be planned for a specific day of disbursement. An example of items falling within this category would be:

Taxes on income
Dividends payable to stockholders
Salaries and wages
Contributions
Professional services (those rendered on an annual-fee basis)

Those items that fall due at regular intervals but will fluctuate as to amount are in the next category, as, for instance, advertising agency billings and certain raw material suppliers.

In the third category will be those that a significant disbursement is anticipated for but the exact date of payment is not known, such as capital expenditures and cash transfers between divisions.

Still another class and perhaps the most significant in planning consists of those items that are nominal in amount but numerous in quantity—our "regular" recurring disbursements out of the Bank 1—East:

Petty cash	Utilities
Cash advances	Travel expense
Raw material purchases	Services, etc.

Concept of Mail Float—Disbursements

In addititon to the bank float on disbursements discussed above, we gain on the basis of average daily bank balances from a further delay of our issued checks being charged against our bank balance in the form of mail float. There is little that can be elaborated upon in this area because it is quite obvious that a letter takes a certain interval of time to arrive at its destination. It is only mentioned as a further consideration in maintaining a tighter control on our bank balance, especially in view of the fact that the substantial portion of our accounts payable are settled out of the home office.

Results

After the initial investigation, the basic goal will be realizable with a

* Dollar difference of the average float between the two methods is due to alternate method subtracting three days at once.

minimum of manhour effort, an expense that should be more than offset by (1) the initial releasing of more cash for short-term investment and (2) the long-run benefits of an effectively controlled cash-flow program.

A format of reporting, in a summary form, would be as follows:

Estimated cash receipts from all sources	$_____
Less: Estimated cash disbursements to all sources	_____
Total excess cash income over cash disbursements	$_____
Balance of cash at beginning of period	_____
Total cash available	$_____
Desired balance	_____
Increase (Decrease) for investment	$_____

What is the stimulus for taking thought for tighter control over cash, thereby releasing more for investment in business and/or short-term investments? The main incentive is the ever-increasing need for tighter profit control.

More available cash means less borrowing, thereby reducing interest expense; moreover, it generates interest income through the use of excess cash. It also enables the company to formulate long-range plans with less dependence on outside economic conditions.

Revenue Agents Attack Inventory Valuations

by ARTHUR A. RAUTIO*

SOUND THE ALARM to treasurers, controllers and tax specialists. The Internal Revenue Service is scrutinizing inventory valuation as a part of its regular examinations. It appears, from inquiries posed to accountants in other areas and states, that this inventory valuation review by the Service is concentrated in a relatively confined geographic location at present. However, the writer's inquiries have been limited and thus the assumption as to an area "test" may be incorrect.

The valuation of factory inventories at standard cost has been accepted for many years. A case of record on this point is the Milwaukee Valve Co. case. This acceptance has been evident even though the regulations pertaining to inventories specifically prohibit, "taking work in process, or other parts of the inventory, at a nominal price or less than its proper value." It is true, however, that in the past the examining agents, with minor exception, have given inventories only a passing glance.

Under Section 471 of the Internal Revenue Code, the valuation of inventories must meet the following tests:

1. It must conform as nearly as may be the best accounting practice in the trade or business, and
2. It must clearly reflect income.

Regulations under Section 471 further state:

> "It follows, therefore, that inventory rules cannot be uniform but must give effect to trade customs which come within the scope of the best accounting practice in the particular trade or business. In order to clearly reflect income, the inventory practice of a taxpayer should be consistent from year to year, and greater weight is to be given to consistency than to any particular method of inventorying or basis of valuation as long as the method or basis used is substantially in accord with Section 471-1 through 471-9. An inventory that can be used under the best accounting practice in a balance sheet showing the financial position of the taxpayer can, as a general rule, be regarded as clearly reflecting his income."

It is apparent that examining agents have, in the past, applied the foregoing regulations loosely in their examinations of factory inventories.

As further justification of standard costs as a proper valuation method, we note that the American Institute of Accountants Research Bulletin No. 43 states in part as follows: "Standard costs are acceptable if adjusted at reasonable intervals to reflect current conditions so that at the balance-sheet date standard costs reasonably approximate costs computed under one of the recognized bases."

Unfortunately, many manufacturers on standard cost are using an outdated standard. This, of course, results in an understatement of inventories at the close of any fiscal period. Generally this fact is highlighted to the examining agent by the labor and material variation and unabsorbed overhead accounts. Upon finding an inventory which appears understated, the agent will contend that the amount of unabsorbed overhead and

* Partner, Knust, Everett & Cambria, Hartford, Connecticut.

totals of labor and material variation accounts should be prorated between the inventory and cost of goods sold accounts. In the majority of instances, this computation results in a substantial tax deficiency.

What can be done to counter the agent's contention? Each case, of course, must stand on its own facts. However, there are certain basic avenues of approach that should be given serious consideration and study:

1. Those manufacturers who have outdated standard costs should consider the opportunity of allocating the increase in inventory valuation over a number of years as provided in Section 481 of the Internal Revenue Code.
2. The alternative approach is to do nothing at this time and tackle the problem when it arises as a result of a revenue agent's examination. If the change in valuation is proposed by the revenue agent, the taxpayer can seek relief under Section 481 of the Internal Revenue Code. The agent, if he proposes the change, should eliminate from the total adjustment the amount attributable to the period prior to January 1, 1954. Perhaps the revenue agent would contend that the change in inventory valuation proposed by him is not a change in accounting method as intended by Section 481 but rather a correction of an error. The Congressional Committee Reports, however, state, in effect, that a change in accounting method includes a change in valuation of inventories.

The problem and its solution is still very much "up in the air," inasmuch as case history under Section 481 of the 1954 Code is nonexistent as of this date. Each case must be considered on its own merits and tax counsel must decide whether the amount of tax involved is worthy of litigation. Certainly, until some taxpayer who firmly believes in "principles" fights for the application of Section 481 through the Tax Court, we will not be able to judge which approach is advisable.

Keeping the Liquid Position before Management

by KENNETH R. RICKEY

LIQUID POSITION indicates nothing else but simply cash plus accounts receivable, less current liabilities. Simple as it is, the liquid position can be used as an excellent guide for managerial control of the financial condition of a company and tell us, currently, the dollars invested in inventories. It is something any good accountant can prepare daily or weekly in less than two hours, whether the business is small, medium, or large.

Let us look at the statement below and see what flows through the three major items used to get the liquid position:

I. *Cash*
   - A. Incoming
     1. Accounts receivable
     2. Notes receivable
     3. Short-term loans made
     4. Sale of fixed assets
     5. Bonds or long-term debt
     6. Sale of capital stock
   - B. Outgoing
     1. Accounts payable
     2. Pay rolls and fringe benefits
     3. Taxes
     4. Dividends paid
     5. Short-term loan retirements
     6. Acquisition of fixed assets
     7. Long-term debt retirement

II. *Accounts Receivable*
   - A. Increases
     1. Sales
   - B. Decreases
     1. Collections
     2. Credit memoranda
     3. Uncollectible accounts

III. *Current Liabilities*
   - A. Increases
     1. Materials
     2. Expenses
     3. Pay rolls and fringe benefits
     4. Taxes payable
     5. Dividends payable
     6. Short-term loans
     7. Fixed assets
     8. Current retirements of long-term debt
   - B. Decreases
     1. Cash payments
     2. Debit memoranda

KENNETH R. RICKEY, Peninsula-San Jose Chapter (Chicago, 1946), is Controller and Chief Financial Officer of the Ampex Corporation, Redwood City, California. He was previously Vice President of Finance with Lenkurt Electric Company, San Carlos, California. Mr. Rickey was graduated from the University of Iowa with a B.S. degree. He is Past President of the Chicago Chapter. A previous contributor to the *Bulletin*, Mr. Rickey, is a recipient of four Certificates of Merit. The most recent one was awarded for this article.

Elko Company

Financial Position

January 31

Current Assets		**Current Liabilities**	
Cash	$ 1,000	Accounts Payable	$ 1,000
Accounts Receivable	3,000	Payrolls and Fringes	500
Inventories	5,000	Taxes	1,000
		Short-term loans	1,000
		Long-term loans (1 year)	200
		Dividends Payable	200
Total Current Assets	$ 9,000	Total Current Liabilities	$ 3,900
Fixed Assets		Long-term loans	2,000
Land	500		
Building	4,500		
Equipment	2,000		
	$ 7,000		
Less Reserves for Depreciation	1,000		
Net Fixed Assets	$ 6,000	Total Liabilities	$ 5,900
		Stockholders' Equity	
		Capital Stock	$ 5,000
		Retained Earnings	4,100
			$ 9,100
Total Assets	$15,000	Total Liabilities and Stockholders' Equity	$15,000

EXHIBIT 1

We can see that every transaction of a business operation eventually finds its way into one of these major accounts. Perhaps this is why credit men have used these figures for years to get the common "quick ratio." We, too, can use these figures to detect changes in our inventories from week to week, and fill an important gap in the time lag of reporting.

Let us examine the major classifications in the financial position of a company to see how they affect the liquid position.

I. *The liquid position items*
   - Cash
   - Accounts receivable
   - Current liabilities

II. *Other items*
   - Fixed assets
   - Long-term debt
   - Capital stock
   - Retained earnings and dividends paid

Elko Company
Results of Operations
By Weeks for Month of February

	2-7-60	2-14-60	2-21-60	2-28-60	Total Month of February
Net Sales	$ 200	$ 400	$ 800	$1,100	$2,500
Cost of Sales					
Beginning Inventory	5,000	5,380	5,540	5,460	5,000
Additions	500	400	400	200	1,500
Total	5,500	5,780	5,940	5,660	6,500
Ending Inventory	5,380	5,540	5,460	5,000	5,000
Cost of Sales	120	240	480	660	1,500
Profit Pickup	80	160	320	440	1,000
Capacity Costs	150	150	150	150	600
Gross Earnings	$ (70)	$ 10	$ 170	$ 290	400
Income Taxes					200
Net Earnings					$ 200

EXHIBIT 2

The ability to pay should include all current liabilities, including payments for fixed assets, long-term debt, and dividends payable within a year. A typical financial position is shown on Exhibit 1. The liquid position is:

Cash	$1,000
Accounts receivable	3,000
Total:	$4,000
Less current liabilities	3,900
Liquid position	$ 100

$$\text{Quick ratio} \frac{4,000}{3,900} = 1.02 \text{ to } 1.00$$

or 102 percent.

Usually when cash and receivables are equal to or greater than (quick ratio of 100 percent or better) current liabilities, a company's ability to pay and its current financial conditions are satisfactory. However, since any one financial position presents only the financial condition at that specific date, the trend of each company should be studied before making any final conclusions.

Equally important is the way in which the liquid position can tell us the trend of our inventories on a

Elko Company

Financial Position

At the Dates Indicated

	1-31-60	2-7-60	2-14-60	2-21-60	2-28-60
Cash	$1,000	$1,000	$ 800	$ 900	$1,000
Accounts Receivable	3,000	2,900	2,800	2,700	3,400
Total	4,000	3,900	3,600	3,600	4,400
Less Current Liabilities	3,900	4,180	4,040	3,960	4,100
LIQUID POSITION	100	(280)	(440)	(360)	300
Inventories	5,000	5,380	5,540	5,460	5,000
Working Capital	5,100	5,100	5,100	5,100	5,300
Fixed Assets - Net	6,000	6,000	6,000	6,000	6,000
Total	11,100	11,100	11,100	11,100	11,300
Less Long-term Loans	2,000	2,000	2,000	2,000	2,000
Net Assets	$ 9,100	$ 9,100	$ 9,100	$ 9,100	$ 9,300
Represented by:					
Capital Stock	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Retained Earnings	4,100	4,100	4,100	4,100	4,300
Total	$ 9,100	$ 9,100	$ 9,100	$ 9,100	$ 9,300

EXHIBIT 3

weekly basis within a matter of a couple of hours. A simple example is presented in Exhibit 2. Beginning and ending inventories are shown. The sales are increasing each week, and the inventory is increased early in the month in anticipation of larger shipments the last week of the month. Capacity costs are period costs, hence are spread evenly over the four weeks. Income taxes are not computed or picked up in current liabilities weekly, only at month end.

Exhibit 3 shows the financial position at the end of each week in February, without regard to income taxes and profit during the month. Fixed assets and long-term loans are kept constant for this illustration. Inventories are the same as shown in Ex-

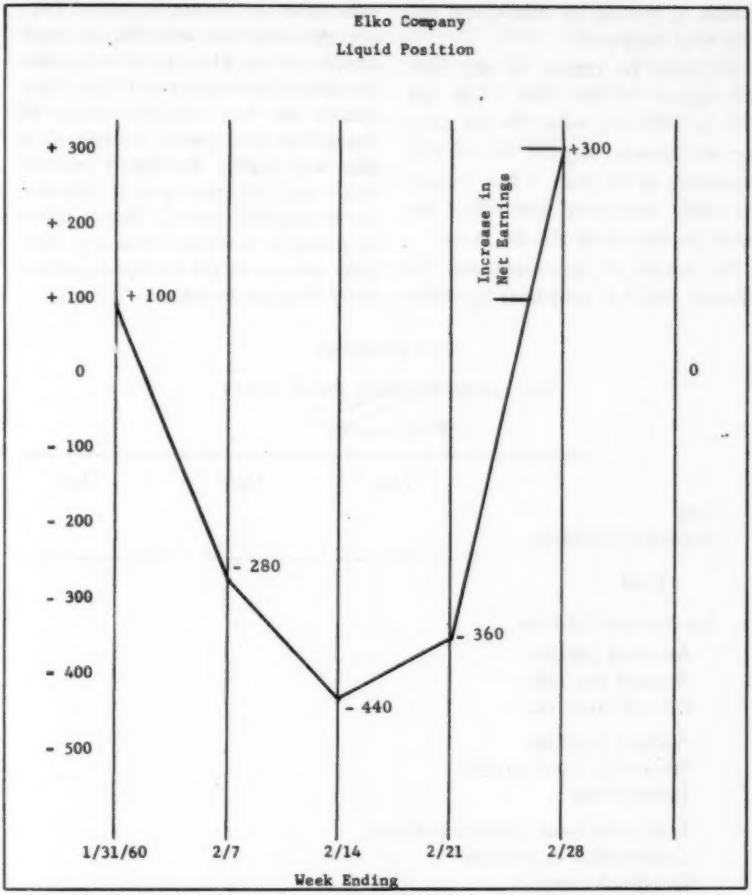

EXHIBIT 4

hibit 2. Current liabilities, accounts receivables and cash are changed to reflect the flow each week of sales, collections and payments.

A quick glance at the chart presented in Exhibit 4 indicates that the liquid position is changing. What is the reason? Did we buy a capital asset, pay any long-term debt or any dividends, or were there any unusual transactions outside of working capital? The answers are no, we did not. Therefore, we can say our inventory must have increased, or decreased, by the amount of the change in the liquid position. Referring to the figures in

Exhibit 3, we can see that this is exactly what happened.

We must be certain of the facts that appear on the chart. The last week in February, when the net earnings are known, they are shown very specifically on the chart. Other changes previously mentioned that affect the liquid position must also be shown.

The results of operations and the financial position statements by weeks were used for illustration only. Usually they are not available in most companies on Monday morning for the close of operations on Friday. Very seldom are they available within 48 hours after the close of a month. For this very reason the liquid position fills a very important gap in reporting for managerial control. Shown below is a simple worksheet that any company can use to get its liquid position every Monday morning:

YOUR COMPANY

THE LIQUID POSITION WORK SHEET

Week ending _____

	Date	*Date*	*Date*
Cash			
Accounts receivable			
Total			
Less current liabilities			
Accounts payable			
Accrued pay rolls			
Pay-roll taxes, etc.			
Accrued payables			
Short-term loans payable			
Income taxes			
Long-term loans (current portion)			
Construction in progress			
Dividends payable			
Total			
Liquid position			
Change caused by			
Proceeds from long-term loans			
Capital expenditure payments			
Dividends paid			
Profits			
Tax payments			
Inventories increase or reduction			
Other items peculiar to your company			

It is easy to use; any accounting system should contain the information required. Test it on your last twelve months. Then try it on a weekly basis, starting today. You will be amazed at the results. Then start a weekly report to management with a chart like that on Exhibit 4. Deliver it personally at 10:00 a.m. every Monday morning with a brief verbal explanation of the week's activities. You will soon find the liquid position a real tool for management.

Two Letters on Leasing

Some Comments on Lease Accounting

by HAROLD G. AVERY*

TWO WELL-WRITTEN ARTICLES[1] which appeared in the December 1960 issue of *N. A. A. Bulletin* contained remarks concerning the accounting treatment for financial leases on the balance sheet. Professor Anthony contended that "the lease obligation is debt and, although it does not appear on the balance sheet as such, many well-informed lenders will include this obligation as debt when they are appraising the company's borrowing capacity." Mr. Rhodes' article was devoted to pointing out the need for accountants to recognize leasing in the form of debt financing as balance sheet items—the leased property as an asset and the related commitment to pay out funds as a liability.

It is my opinion, however, that the method recommended by the Committee on Accounting Procedure of the AICPA is the proper one at present, i.e., that, where circumstances are material, disclosure should be made in a footnote or in a supplementary explanation to the balance sheet. There are several reasons for this stand.

First, there is a difference between an obligation arising under a conditional sales contract in which the asset and obligation appear on the balance sheet, and an obligation under a long-term financial lease in which the asset-liability relationship is not reported in monetary terms. The intention of the parties is different. In the case of a conditional sales contract—if all the provisions of the lease have been fulfilled—the title in the property passes to the lessee, who thus becomes the owner of the property. Otherwise, the title to the property remains with the lessor. On the other hand, in the instance of a long-term lease, there is no intention on the part of the lessee to take title to the asset at the expiration of the lease. The title always remains with the lessor, his heirs or assigns.

Second, the evaluation problem is one of abstract conjecture, and should not form a part of recognized accounting procedure. Suppose a new hotel property consisting of land and building is leased for 99 years at $1,000 per month (no escalator clause). How would an accountant go about constructing a balance sheet for the lessee, such as setting up the value of the building as distinct from the land, and reporting the present value of the obligation due the lessor? Will one discount the liability on the basis of $1,000 a month or $12,000 a year? At 2, 4, 6, or 8-percent rate? During the term of the lease the building depreciates but the site does not, in which case, how will the obligation be allocated between the two classes of property? Take the case of a farm lease for 25 years, or even one with an indeterminate date. (Here we run into the problem of accounting semantics. What is a financial lease? A long-term lease? Goodness knows, the accounting profession already is plagued with too much conflicting terminology). The tenant farmer will have possession of the farm and the use of the land, buildings, wells, fences, timber, etc., as long as he lives. It becomes almost impossible from an accounting

* Professor of Economics and Accounting at Union College, Schenectady, N. Y.

[1] Robert N. Anthony, "Some Fallacies in Figuring Return on Investment," and Jack Rhodes, "Financial Leases Belong on the Balance Sheet."

viewpoint to reduce the rights inherent in the lease to a pecuniary figure. For example, the lease may provide for payment in kind, one-third of small grain raised delivered to the nearest elevator, two-fifths (or one-half) of corn shelled in the crib, or a fifty-fifty basis for the hay and feed crops, with seed being furnished by the landlord.

Finally, accounting techniques are not designed to solve dilemmas created by business transactions already having basic historical precedents acceptable by the legal fraternity. One either has title to property or he does not, irrespective of possession and use. The laws governing property and contract are pretty well established. Therefore, accounting rules cannot ignore title as being irrelevant and substitute arbitrarily the right to use as the basis for reporting assets and liabilities.

Although the reporting of (financial) leases in footnotes and in supplementary balance sheet data results in some unusual comparative statements of assets and liabilities (as in the case of some large chain stores), the method advocated by the AICPA is sound, since it does fulfill the requirements of full disclosure, without creating a balance sheet containing values in terms of dollars on little more ground than mere guesswork.

Pros and Cons of "Lease-Purchase" Plans

by CHARLES B. ALLEN*

THESE COMMENTS do not particularly relate to automobile leasing or office equipment rentals, as such plans are desirable primarily due to the obsolescence involved. In essence, however, leasing is merely another form of debt financing, in many ways similar to regular borrowing. The lease obligation is fixed, similar to interest and sinking fund retirements for long-term borrowings. Lease "borrowings" draw on the credit of the borrower—a credit which is limited and, if used in one form, it is not available in another. Leasing should be viewed on its relative merits as compared with other forms of raising capital. For major capital projects, leasing is not advantageous from the financial viewpoint. Sufficiently important nonfinancial advantages must exist to outweigh these disadvantages before leasing is considered.

The large oil companies and the big food chains are the principal users of leasing arrangements. The oil companies finance most gasoline service stations and ocean-going tanker purchases by leasing. The food chains have used this method to finance the acquisition of new properties. The railroads and airlines have lately been more or less forced into leasing.

The lessor can advance the money during the construction of new facilities, or purchase the property at the appraised market value. The lease payments return to the investor the original investment with a predetermined rate of interest. The length of the lease is determined by the economic life of the asset, but is usually shorter, depending on the credit standing of the lessor. Manufacturing facilities are generally not leased for more than 20 years, and land leases have gone over 999 years.

The advantages and disadvantages of the lease-purchase plan depend on the financial position of the company, possible tax savings and special circumstances. The pros and cons may be summarized as follows:

* Budget Director, Anaconda American Brass Company, Waterbury, Connecticut.

ADVANTAGES

1. There are short-term advantages where convenience, flexibility, temporary facility requirements and the desire to avoid obsolescence may be required.
2. There may be tax advantages, as compared with straight-line depreciation, or where facilities sold and leased back are fully depreciated. The 1954 tax code, permitting concentrated write-offs in the early years, has largely nullified these advantages.
3. Land values can be written off for tax purposes.
4. Makes cash available.

DISADVANTAGES

1. Rate of return to the investor is usually higher than on direct obligations. The difference is at lease one percent, or even greater.
2. For an asset with long life, the lessor usually loses the remaining value. Many leasehold payments amortize the investment during the initial lease, and this inevitably increases the cost above direct borrowing.
3. The surrender of residual values means ultimate loss of control of the property.
4. Tax benefits may be uncertain unless the plan is so worded that it acts to the detriment of the lessor.

It would appear that, due to the relatively high cost, lease-purchase plans are rarely justifiable on a financial basis. Nonfinancial benefits, such as avoidance of service problems, obsolescence, or extreme irregularity of demand, would have to outweigh the additional costs involved.

Beyond These Covers

Books

Cost Accounting

Gordon Shillinglaw, Richard D. Irwin, Inc., Homewood, Illinois, 1961, 779 pp., $10.65.

Suggesting prefatorily that the term "internal managerial accounting" may be more accurate than cost accounting for the functions now embraced in it, the author of this text offers comprehensive coverage in the management accounting field. Budgets and the budgeting process are thoroughly dealt with, along with treatment of cost-volume-profit analysis.

Accounting Principles

Howard S. Noble and C. Rollin Niswonger, South-Western Publishing Company, Cincinnati 27, Ohio, Eighth Edition, 1961, 786 pp., $7.

Intended to equip the first-year accounting student with a rounded knowledge of the structure and uses of accounting, this presentation illustrates its application to service and merchandising enterprises, before major attention is given to manufacturing. Budgeting, reporting, and statement analysis are treated in the closing chapter.

Advanced Accounting

Wilbert E. Karrenbrock and Harry Simons, South-Western Publishing Company, Cincinnati 27, Ohio. 3rd Edition, 1961, 965, pp., $7.95.

An advanced text should carry on to those topics in accounting which have frequent, though not invariable, application in practice. This new edition of a much-used text, fills the prescription in many directions, e.g. through intensive treatment of partnership, consolidations, and the "special sales procedures" called for by installment and consignment sales, as well home office relationships with branches.

Essays on Accountancy

A. C. Littleton, University of Illinois Press, Urbana, Illinois, 1961, 637 pp., $10.

The opinions and viewpoints of a respected and time-honored teacher of accounting, now retired, are offered through the numerous selections brought together in this volume. They deal, in separate sections, with accounting history, theory and education. The essays are mainly selections from published articles by Professor Littleton.

The Theory and Measurement of Business Income

Edgar O. Edwards and Philip W. Bell, University of California Press, Berkeley 4, California, 1961, 323 pp., $7.50.

The full-length study presented in this volume is carefully developed. It concludes with, and emphasizes, the need to reflect price level changes in the accounting process. These are classified as general and individual changes. Specific chapters are devoted to methods of doing so. The "hurdle of practicality" is discussed.

Conference of Accountants

University of Tulsa, Tulsa, Oklahoma, Paper Bound, 1961, 103 pp.

The "accounting papers" delivered at the April 1961 conference of the University of Tulsa are promptly published here. Among timely topics treated are "Controlling the Use of Capital", "Quality Control Techniques Useful in Accounting" and How Production Research Can Improve Profitability."

Dynamic Management in Industry

Raymond Villers, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1960, 516 pp., $10.

Incorporating treatments of sales forecasting, budgeting, profit control and long-range planning—all of which are topics of much concern to the accountant—this text primarily offers thorough coverage of scientific management in the light of new techniques such as those grouped under the heading of operations research.

A Guide to Current Techniques in Financing

Harry Gross and Maxwell J. Mangold, Pilot Books, 42 West 33rd St., New York 1, N. Y., Paper Bound, 1961, 33 pages, $2.

The "ten methods of financing for company growth" to which this booklet is devoted include short-term bank loans, long-term loans, factoring, syndicate financing, public financing, direct and indirect Federal loans, and state development companies. The closing chapter details deficiencies in fiancial statement presentation often detrimental to proposed financing, and suggests corrective measures.

The Ideologies of Taxation

Louis Eisenstein, Ronald Press, 15 East 26th Street, New York 10, N. Y., 1961, 263 pp., $5.

A readable critique of Federal income tax law as to consistency and effectiveness, this book closes with a chapter entitled, "A Restrained Conclusion," tending in the direction of achievement of more complete basic communication to the American people of the effects of existing tax law. This knowledge, it is indicated, should be applied in choosing Congressmen.

Investments

Downie, Fuller and Calkins, John Wiley & Sons, Inc., 440 Park Ave. South, New York 16, N. Y. Third Edition, 1961, $9.

Perhaps the most useful material to the accountant, contained in this book, consists of the nine chapters on investment selection. These give a "how others see us" viewpoint, valuable to companies, through indication of how investment analysts use available financial information.

Systems Analysis for Business Management

Stanford L. Optner, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1960, 276 pp., $8.

The systems meant by the title of this book are "total" in the sense that they relate to all phases of the informational structure which governs the succession of events in a company. Electronic data processing information systems are treated in Chapters 6 and 7. The case studies of systems use and application are given in the latter half of the text.

A Guide to Office Clerical Time Standards

Systems & Procedures Association, 4463 Penobscot Building, Detroit, Michigan, Paper Bound, 1960, 169 pp., $15.

Anonymous Companies A to G provide the detailed figures for operating times given in this book, enabling others studying the information to decide how equally serviceable data may be obtained by adaptation or fresh study in their own cases. The initial chapter describes "a program for clerical cost control."

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